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RAW MATERIALS TRANSPORTATION COSTS AND THEIR INFLUENCE ON THE USE OF WASTEPAPER AND SCRAP IRON AND STEEL. VOLUME II. APPENDICES

RESOURCE PLANNING INSTITUTE

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The grant study evaluates the importance of transportation charges for virgin and competing secondary materials in the investment decisions of the steel and papermaking industries. Three major modes of transport are considered - rail, motor carrier, and inland water barge. Transportation charges are evaluated with respect to revenues generated for carriers. Comparisons of differences in charges are made on both a direct and a chemical-equivalent basis. The report provides substantial empirical data on transportation rates, volume of shipments, and origin and destination for the selected materials. Volume II contains the background material.

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Volume II. Appendices

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FOREWORD

Man and his environment must be protected from the adverse effects of pesticides, radiation, noise and other forms of pollution, and the unwise management of solid waste. Efforts to protect the environment require a focus that recognizes the interplay between the components of our physical environment--air, water, and land. The National Environmental Research Centers provide this multidisciplinary focus through programs engaged in

- studies on the effects of environmental contaminants on man and the biosphere, and
- a search for ways to prevent contamination and to recycle valuable resources.

As part of the attempt to recycle valuable resources, this two-volume study evaluates the importance of transportation charges for virgin and competing secondary materials in the investment decisions of the steel and papermaking industries with respect to rail, motor carrier, and water carrier. Volume II contains background material.

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ABSTRACT

The study examines the transportation revenues for virgin and secondary materials in the steel and paper industries, with respect to three major modes of transport - rail, motor carrier and water carrier. The investigation addresses itself to three specific questions: What are the transportation revenues for virgin and secondary materials in these industries? What is the differential for shipping virgin and secondary materials in these industries? What changes, if any, can be made to encourage the increased use of secondary materials in these industries?

The study examines rate differentials of virgin and secondary materials in the perspective of the corporate manager who must select production materials as part of the larger framework of total corporate investment in plant, equipment and natural resources. The study examines the fact that transportation charges, like any charges, do not take place in a vacuum but are affected by a myriad of factors, including shipping volumes, corporate investment decisions, public policy, market conditions and plant locations. In this light, the study examines the transportation charges for paper and steel production materials, both virgin and secondary, and then assesses the significance of these charges in relation to the production costs of final products.

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APPENDIX A

AN EXAMPLE OF THE COMPETITION OF THE VIRGIN AND SECONDARY RAW MATERIALS IN THE STEEL INDUSTRY

The following article from the June 14, 1973, edition of the Wall Street Journal provides some contemporary evidence that virgin and secondary materials compete in the investment decision. The article reaffirms the key assumption used in this study.

BETHLEHEM STEEL TO CUT CAPACITY SHARPLY AT ONE PLANT, PARTLY DUE TO POLLUTION COSTS

BETHLEHEM, Pa. - Bethlehem Steel Corp. said it will sharply reduce capacity at one of its oldest steelmaking shops, Johnstown, Pa., over the next four years by phasing out open-hearth furnaces there and replacing them with an electric furnace shop.

Potentially costly pollution-control expenditures played a major part in the decision and timetable, Bethlehem observed. The plan is to cut the complex's annual steelmaking capacity from 2.3 million tons to about one million tons by 1977. That would require phasing out all eight open hearths, three of the plant's four blast furnaces, three coke batteries and numerous semifinishing and finishing operations. At the end of the program, which will cost more than $87 million, Bethlehem said employment at Johnstown will have dropped to about 7,100 from 11,800.

Studies showed that to continue running the plant at current capacity would have required the expenditure of "well over" $300 million, including $100 million for full pollution control, Bethlehem asserted. Such an investment would have generated a "poor return," the nation's second-largest steelmaker added.

The company emphasized, however, that the size of the pollution-control spending wasn't the deciding factor in the reduction - although it did speed up the timing of the announcement. The steelmaker cited "changing markets, age, location, physical layout of the plant, higher future produce quality requirements, and more costly and restrictive transportation facilities for receiving raw materials and shipping plant products."

The Johnstown facility - the country's largest steel plant in the early 1870s - dates back to the early 1800s, when there were iron-making operations there. Existing facilities were nearly wiped out in a disastrous flood in 1889 but were later rebuilt and expanded. In the early part of this century, the plant operated under the name of Midvale Steel & Ordance Co. Bethlehem bought the plant in 1923.

The steelmaker didn't specify the size or number of furnaces it would install, but steel engineers speculated that two electrics of 200-ton capacity each probably would be sufficient to produce one million tons annually.

Electric furnaces, unlike open hearths and basic oxygen furnaces, can operate entirely on a so-called "cold charge" of 100% scrap. This eliminates the need for hot metal, or molten iron, from the blast furnaces, which operate on huge quantities of coke, or baked coal, produced in coke ovens. It is this latter operation that causes steelmakers their principal air pollution problem and is the subject of intensive industry and government study to find solutions.

Over the last couple of years, the Johnstown plant's open hearths have been at the forefront of discussions among steel industry analysts as among those likely to be closed for air quality reasons. There is dispute on the subject, but some analysts suggest that perhaps as much as 60 million tons of existing open-hearth capacity will have to be closed to meet air quality standards - or be fitted with costly cleaning devices ranging up to $1 million per furnace.

This isn't the first Behtlehem plant to be cut back in size in recent years. Two years ago, the effective capacity of the huge Lackawanna plant in upstate New York was reduced to 4.8 million tons from 6.4 million, due, in part, to similar reasons.

Bethlehem said that of the $87 million to be spent at Johnstown, the electric furnace installation will cost about $35 million, including expenditures for full pollution control, with an additional $41.8 million to be spent for other plant pollution-control purposes. The rest of the money will be spent for "essential maintaining requirements on existing equipment," the company added.

Under current plans, little change will occur in plant operations before the latter part of 1974, Bethlehem said, to minimize disruptions of work force and community. A timetable on the phase-down will be worked out by Oct. 31, it added.

Among finishing operations to be phased out, the steelmaker said, will be the platemills, some bar facilities and a portion of the rod operation.

Bethlehem said the average age of the employees at Johnstown is 43.6 years, with an average length of service of nearly 20 years. All will be able to apply for jobs at other Bethlehem plants and will be given preference over the newly hired. When the cutback is completed, Bethlehem stated its Johnstown payroll will be around $90 million, down from $130 million, and its Johnstown-area purchases will slip to about $4 million from $5 million.

APPENDIX B

COMMODITIES HAULED BY RAILROADS SINCE 1956, COMMODITIES MOVED BY WATER IN 1971 AND RIVER SYSTEM CHARACTERISTICS

The tables included in this appendix indicate annual total amounts of those commodities of interest to this study, moved by the national rail and waterway transportation systems. Data for waterways is provided for one year only (1971), due to the detailed breakdown for each system of the inland waterway network. Data for the rail network, however, is given chronologically for a sixteen-year period due to the availability of the Interstate Commerce Commission's Freight Commodity Statistics for Class I railroads. The annual figures for rail were compiled from annual reports of freight statistics, and when annual figures were not obtainable, figures from quarterly reports were computed and totaled. Comparable data for the motor carrier industry could not be found for such consistent chronological presentation. The two tables referenced solely from 1971 Inland Waterborne Commerce Statistics illustrate the total mileage lengths of transportation networks. One table pertains to commercially navigable waterways and shows the mileage breakdown of individual river and coastal systems by six categories for varying depths; the other table illustrates total mileage of each transportation network, including commercially navigable waterways, as well as railroads and highways.

Table B-1. DOMESTIC WATERBORNE COMMERCE SHIPPED ON MAJOR INLAND WATERWAYS-1971
(net tons)

Waterway systems	Iron ore & concentrates	Limestone flux & calcareous stone	Coal & lignite	Coke	Scrap iron & steel	Roundwood	Wood pulp	Wood chips & residue	Scrap paper
Mississippi River System									
Mississippi	312,729	15,618	20,802,965	613,141	361,764	197,895	232,455	6	
Ohio	243,702	921,155	57,708,905	349,319	285,718		1,125		
Illinois Waterway	20,778	41,765	7,049,016	54,465	148,076		13,454		
Missouri River					2,183				
McClellan-Kerr Arkansas River Navigation System			41,944	684	5,761	5,907	4,446		
Allegheny River		9,374	2,763,451		43,565				
Monongahela	196,779	416,581	28,079,324	127,821	15,489				
Kanawha River		67,874	7,469,588	41,390	12,337				
Green & Barren Rivers			14,494,824						
Cumberland			137,690		20,008				
Tennessee	6,239	783,713	10,722,046	80,845	97,154	313,065	18,384		
Gulf Intracoastal Waterway System									
Houston Ship Channel	29,105	7,930	237,388		15,195		10,736	6	
Black Warrior Tom Bigbee River	2,431,678	724,400	4,277,725	210,000	17,950	218,759			
Apalachicola, Chattahoochee & Flint						23,250			
Atlantic Intracoastal Waterway									
Norfolk, Va.-- St. Johns River, Jacksonville				37,895	81,600	709,783	171,372	33,021	
Delaware River			1,470,387	35,911	261		186,767		
Hudson River			117,155		123,490				
Pacific Coast Waterways									
Columbia River					204		223,250	391,085	
Great Lakes	65,309,531	28,334,549	26,105,089	127,139	214,595	26,603	101,374	17,521	29,592
Total for all inland water traffic	68,521,436	31,332,959	181,477,497	1,678,610	1,445,350	1,558,707	963,363	441,639	29,592

* including petroleum coke.

Source: American Waterways Operators, Inc., 1971 Inland Waterborne Commerce Statistics, October 1972 and U.S. Department of the Army, Corps of Engineers, Waterborne Commerce of the United States, Calendar Year 1971, Parts 1-5.

Table B-2. ANNUAL AMOUNT OF VIRGIN AND SECONDARY STEEL RAW MATERIALS TRANSPORTED BY RAIL
(tons)

Year	Virgin material				Secondary material
	Iron ore	Metallurgical coal	Coke	Pig iron	Scrap iron and steel
1956	113,148,188	380,727,410	21,527,773	6,160,841	27,918,311
1957	122,596,373	372,194,054	19,563,630	5,246,769	24,035,780
1958	--	--	--	--	--
1959	70,283,400	305,290,753	16,150,466	14,346,395	20,376,101
1960	96,846,698	304,500,304	16,452,862	3,347,136	20,279,014
1961	77,416,703	286,683,908	14,388,106	3,801,473	20,076,326
1962	79,056,275	312,874,057	15,466,767	3,290,351	17,901,422
1963	80,348,480	331,667,026	16,436,096	3,385,811	20,596,817
1964	96,690,586	338,120,767	19,527,100	3,704,313	24,618,173
1965	97,020,036	350,208,317	20,053,232	3,942,808	26,991,088
1966	107,334,638	364,034,582	20,474,163	4,095,399	27,395,912
1967	92,784,235	373,689,022	18,624,027	3,726,699	25,469,377
1968	94,096,123	368,101,343	19,932,703	4,296,206	26,716,415
1969	104,700,694	372,908,505	16,230,944	4,608,807	29,672,820
1970	104,208,467	395,016,613	16,039,659	4,628,062	28,183,281
1971	91,267,293	351,316,299	13,047,134	3,534,160	26,608,750

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1956-57, 1959-71.

Table B-3. ANNUAL AMOUNT OF VIRGIN AND SECONDARY PAPERBOARD RAW MATERIALS TRANSPORTED BY RAIL
(tons)

	Virgin material		Secondary material
Year	Pulp	Roundwood	Waste paper
1956	4,116,357	40,391,028	3,493,849
1957	3,957,128	38,838,904	3,156,342
1958	--	--	--
1959	4,135,687	41,588,223	3,500,939
1960	4,197,304	43,732,769	3,278,976
1961	4,158,311	42,734,640	3,436,710
1962	4,216,995	44,251,138	3,647,758
1963	4,391.960	44,454,596	3,676,190
1964	4,603,678	36,167,545	3,486,526
1965	5,003,272	37,798,226	3,685,934
1966	5,344,590	41,958,534	3,882,199
1967	4,945,258	40,398,873	3,685,258
1968	5,076,027	40,792,358	3,933,903
1969	5,273,279	43,535,373	4,245,462
1970	5,216,767	43,443,808	4,274,599
1971	5,153,686	43,249,110	4,234,416

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1956-57, 1959-1971.

Table B-4. COMMERCIALLY NAVIGABLE WATERWAYS OF THE UNITED STATES BY LENGTHS AND GROUPED BY DEPTHS

	Length in miles of waterways					
	Under 6 ft.	6 to 9 ft.	9 to 12 ft.	12 to 14 ft.	14 ft. and over	Total
Atlantic Coast Waterways (exclusive of Atlantic Intracoastal Waterway from Norfolk,Va. to Key West,Fla.	1,426	1,241	584	938	1,581	5,770
Atlantic Intracoastal Waterway from Norfolk, Va. to Key West, Fla.	-	65	65	1,104	-	1,234
Gulf Coast Waterways (exclusive of the Gulf Intracoastal Waterway)	2,055	647	1,133	79	378	4,292
Gulf Intracoastal Waterway from St. Marks,Fla. to the Mexican Border,including Port Allen-Morgan City Alternate Route	-	-	-	1,137	-	1,137
Mississippi River System	2,020	969	4,957	740	268	8,954
Pacific Coast Waterways	730	498	237	26	2,084	3,575
Great Lakes	45	89	-	8	348	490
All other waterways	76	7	-	1	7	91
Grand total	6,352	3,516	6,976	4,033	4,666	25,543

Source: American Waterways Operators, Inc. 1971 Inland Waterborne Commerce Statistics, October 1972.

Table B-5. COMPARISON OF NATIONAL TRANSPORTATION SYSTEM NETWORKS*

Airways	227,554 miles
Highways (paved primary and secondary roads)	648,768 miles
Waterways (commercially navigable lengths)	25,543 miles
Pipelines (oil pipelines, excluding gathering lines)	147,472 miles
Railroads (mainline right-of-way)	210,500 miles

* All mileages shown are statute miles for calendar year 1971.

Source: American Waterways Operators, Inc. 1971 Inland Waterborne Commerce Statistics, October 1972.

APPENDIX C

RAILROAD COMMODITY STATISTICS

Railroad commodity statistics are provided for nine commodities for the five year period from 1967 to 1971 (the most recent annual report is that for year 1971 published in 1972). The data was compiled by the Interstate Commerce Commission for all commodities in each of three specified railroad districts as well as the whole United States. These districts, Eastern, Southern and Western, are defined according to the movements of the railroad companies themselves and differ from those five territories defined for the purposes of the Carload Waybill Statistics. Three annual figures have been computed for purposes of this study for each district and for the United States: tons per carload; revenue dollars per carload and revenue dollars per ton. The data from the ICC's Freight Commodity Statistics, Class I Railroads which was utilized to determine these figures was presented as carloads of revenue freight originated, tons of revenue freight originated and gross freight revenue dollars.

Table C-1. RAILROAD COMMODITY STATISTICS
Iron Ore

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	75.8	77.1	77.1	77.4	78.4
Rev./carload ($/carload)	167	173	174	179	206
Rev./ton ($/ton)	2.20	2.24	2.26	2.31	2.63
Eastern district					
Tons/carload	77.4	79.0	79.0	79.0	81.1
Rev./carload ($/carload)	417	442	447	445	564
Rev./ton ($/ton)	5.39	5.59	5.66	5.63	6.95
Southern district					
Tons/carload	82.5	85.6	84.0	82.4	83.6
Rev./carload	175	190	195	199	223
Rev./ton ($/ton)	2.12	2.22	2.32	2.42	2.67
Western district					
Tons/carload	75.0	76.2	76.2	76.8	77.6
Rev./carload ($/carload)	95	98	98	104	114
Rev./ton ($/ton)	1.27	1.29	1.29	1.35	1.47

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-2. RAILROAD COMMODITY STATISTICS
Coking Coal

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	113.3	72.5	74.7	76.6	77.8
Rev./carload ($/carload)	341	219	233	263	290
Rev./ton ($/ton)	3.01	3.02	3.12	3.43	3.73
Eastern district					
Tons/carload	69.6	71.4	73.1	74.8	75.9
Rev./carload ($/carload)	233	239	253	288	320
Rev./ton ($/ton)	3.35	3.35	3.46	3.85	4.22
Southern district					
Tons/carload	72.7	75.5	77.9	79.2	79.9
Rev./carload	163	171	190	208	222
Rev./ton ($/ton)	2.24	2.26	2.44	2.63	2.78
Western district					
Tons/carload	71.9	73.7	78.5	81.9	82.8
Rev./carload ($/carload)	177	182	197	235	290
Rev./ton ($/ton)	2.46	2.47	2.51	2.87	3.50

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-3. RAILROAD COMMODITY STATISTICS
Coke

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	48.4	48.6	44.8	43.8	44.8
Rev./carload ($/carload)	222	231	237	242	290
Rev./ton ($/ton)	4.59	4.75	5.29	5.53	6.47
Eastern district					
Tons/carload	44.0	43.9	42.7	42.9	44.5
Rev./carload ($/carload)	197	209	201	215	257
Rev./ton ($/ton)	4.48	4.76	4.71	5.01	5.78
Southern district					
Tons/carload	48.3	48.5	45.5	46.1	45.1
Rev./carload	242	234	286	266	293
Rev./ton ($/ton)	5.01	4.82	6.29	5.77	6.50
Western district					
Tons/carload	60.4	60.5	54.2	49.0	48.1
Rev./carload ($/carload)	284	284	374	487	582
Rev./ton ($/ton)	4.70	4.69	6.90	9.94	12.10

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-4. RAILROAD COMMODITY STATISTICS
Pig Iron

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	72.1	78.8	91.4	92.2	97.8
Rev./carload ($/carload)	318	344	360	370	454
Rev./ton ($/ton)	4.41	4.37	3.94	4.01	4.64
Eastern district					
Tons/carload	74.0	84.8	108.4	107.7	113.5
Rev./carload ($/carload)	322	360	381	406	486
Rev./ton ($/ton)	4.35	4.25	3.51	3.77	4.28
Southern district					
Tons/carload	69.2	68.3	67.7	67.4	69.1
Rev./carload	202	203	213	229	290
Rev./ton ($/ton)	2.92	2.97	3.15	3.40	4.20
Western district					
Tons/carload	68.3	69.8	71.7	71.9	70.1
Rev./carload ($/carload)	534	551	562	448	590
Rev./ton ($/ton)	7.82	7.89	7.84	6.23	8.42

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-5. RAILROAD COMMODITY STATISTICS
Scrap Iron and Steel

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	51.5	54.5	54.7	54.2	55.1
Rev./carload ($/carload)	223	235	239	262	302
Rev./ton ($/ton)	4.33	4.31	4.37	4.83	5.48
Eastern district					
Tons/carload	54.6	55.4	56.5	56.0	56.8
Rev./carload ($/carload)	215	228	233	251	286
Rev./ton ($/ton)	3.94	4.12	4.12	4.48	5.04
Southern district					
Tons/carload	51.7	52.7	52.3	51.3	52.6
Rev./carload	214	228	224	247	296
Rev./ton ($/ton)	4.14	4.33	4.28	4.81	5.63
Western district					
Tons/carload	50.9	52.9	51.7	51.8	52.5
Rev./carload ($/carload)	246	256	261	290	342
Rev./ton ($/ton)	4.83	4.84	5.05	5.60	6.51

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-6. RAILROAD COMMODITY STATISTICS
Pulp

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	55.6	56.1	57.5	57.8	58.5
Rev./carload ($/carload)	816	878	942	972	1104
Rev./ton ($/ton)	14.67	15.65	16.38	16.81	18.87
Eastern district					
Tons/carload	51.6	51.3	51.3	53.4	54.6
Rev./carload ($/carload)	1624	1629	1666	1748	2096
Rev./ton ($/ton)	31.47	31.75	32.48	32.73	38.39
Southern district					
Tons/carload	57.3	58.1	59.3	59.9	60.3
Rev./carload	483	533	581	594	634
Rev./ton ($/ton)	8.43	9.17	9.80	9.92	10.51
Western district					
Tons/carload	55.7	56.3	58.7	57.7	58.5
Rev./carload ($/carload)	790	865	928	982	1168
Rev./ton ($/ton)	14.18	15.36	15.81	16.50	19.97

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-7. RAILROAD COMMODITY STATISTICS
Roundwood

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	54.6	56.2	56.3	59.0	61.1
Rev./carload ($/carload)	97	99	105	113	123
Rev./ton ($/ton)	1.78	1.76	1.87	1.92	2.01
Eastern district					
Tons/carload	45.1	46.6	47.2	47.7	49.4
Rev./carload ($/carload)	107	112	122	132	133
Rev./ton ($/ton)	2.37	2.40	2.58	2.77	2.69
Southern district					
Tons/carload	56.6	57.6	57.6	61.2	63.9
Rev./carload	88	91	96	105	115
Rev./ton ($/ton)	1.55	1.58	1.67	1.72	1.80
Western district					
Tons/carload	54.3	56.7	56.1	57.4	58.5
Rev./carload ($/carload)	117	116	127	131	139
Rev./ton ($/ton)	2.15	2.05	2.26	2.28	2.38

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-8. RAILROAD COMMODITY STATISTICS
Wood Chips and Residue

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	51.7	51.9	54.1	56.5	58.4
Rev./carload ($/carload)	127	127	135	146	161
Rev./ton ($/ton)	2.45	2.43	2.49	2.58	2.76
Eastern district					
Tons/carload	38.9	39.4	41.4	41.7	43.6
Rev./carload ($/carload)	103	116	129	130	145
Rev./ton ($/ton)	2.65	2.96	3.11	3.11	3.33
Southern district					
Tons/carload	54.1	52.7	56.4	59.3	61.8
Rev./carload	90	85	92	98	108
Rev./ton ($/ton)	1.67	1.61	1.63	1.66	1.74
Western district					
Tons/carload	52.0	52.8	53.8	55.7	56.8
Rev./carload ($/carload)	154	162	174	192	215
Rev./ton ($/ton)	2.96	3.07	3.24	3.44	3.79

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

Table C-9. RAILROAD COMMODITY STATISTICS
Wastepaper

	1967	1968	1969	1970	1971
Nationwide					
Tons/carload	32.6	33.2	33.9	35.6	37.0
Rev./carload ($/carload)	223	241	251	285	335
Rev./ton ($/ton)	6.84	7.26	7.40	8.01	9.05
Eastern district					
Tons/carload	30.6	31.1	31.9	33.0	34.4
Rev./carload ($/carload)	240	262	269	305	368
Rev./ton ($/ton)	7.84	8.42	8.43	9.24	10.70
Southern district					
Tons/carload	37.1	37.0	37.6	39.1	40.8
Rev./carload	208	220	234	265	303
Rev./ton ($/ton)	5.61	5.95	6.22	6.78	7.43
Western district					
Tons/carload	32.0	33.1	33.7	36.1	36.9
Rev./carload ($/carload)	213	232	244	277	325
Rev./ton ($/ton)	6.66	7.01	7.24	7.67	8.81

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Railroads, years 1967-1971.

APPENDIX D

MOTOR CARRIER COMMODITY STATISTICS

Motor carrier commodity statistics are provided for eight commodities for the four year period from 1967 to 1970. (There is generally a two year time lag for the Interstate Commerce Commission's annual statistical report concerning motor carriers and, therefore, the 1970 report is the most recent.) These statistics are given for the United States; for the Eastern district, comprising the New England, Middle Atlantic and Central regions; for the Western district, comprising the Northwestern, Mid-western, Southwestern, Rocky Mountain and Pacific regions; and for the Southern region. Tons per carload, revenue dollars per carload and revenue dollars per ton have been computed, for the United States, the two districts and nine regions, from the following Interstate Commerce Commission data available in Freight Commodity Statistics, Class I Motor Carriers: truckloads of revenue freight originated, tons of revenue freight originated and gross freight revenue dollars.

Table D-1. MOTOR CARRIER COMMODITY STATISTICS
(iron ore)

	1967	1968	1969	1970
United States				
Tons/truckload	14.2	14.1	14.1	15.5
Rev./truckload ($/truckload)	341	329	352	333
Rev./ton ($/ton)	24.01	23.33	24.96	21.43
Eastern				
Tons/truckload	14.8	14.4	14.9	16.3
Rev./truckload ($/truckload)	253	286	263	279
Rev./ton ($/ton)	17.09	19.86	17.65	17.14
New England				
Tons/truckload	9.7	10.8	14.8	8.4
Rev./truckload ($/truckload)	595	241	283	213
Rev./ton ($/ton)	61.34	22.31	19.12	25.34
Mid-Atlantic				
Tons/truckload	15.1	16.7	15.0	13.9
Rev./truckload ($/truckload)	211	243	250	290
Rev./ton ($/ton)	14.01	14.54	16.64	20.91
Central				
Tons/truckload	14.4	12.3	14.5	18.6
Rev./truckload ($/truckload)	329	329	299	278
Rev./ton ($/ton)	22.85	26.75	20.62	14.95
Southern				
Tons/truckload	14.3	15.4	10.3	8.9
Rev./truckload ($/truckload)	365	696	332	306
Rev./ton ($/ton)	25.52	45.19	32.23	34.49
Western				
Tons/truckload	12.8	12.6	13.7	14.7
Rev./truckload ($/truckload)	520	442	514	655
Rev./ton ($/ton)	40.63	35.08	37.52	44.66
Northwest				
Tons/truckload	13.2	13.8	12.1	16.0
Rev./truckload ($/truckload)	346	279	336	841
Rev./ton ($/ton)	26.21	20.22	27.77	52.71
Mid-West				
Tons/truckload	16.4	10.0	18.3	17.8
Rev./truckload ($/truckload)	308	624	173	596
Rev./ton ($/ton)	18.78	62.40	9.45	33.59
Southwest				
Tons/truckload	10.3	15.7	13.4	21.8
Rev./truckload ($/truckload)	397	472	704	891
Rev./ton ($/ton)	38.54	30.06	52.54	40.85
Rocky Mountain				
Tons/truckload	16.9	17.6	19.9	13.3
Rev./truckload ($/truckload)	406	663	793	1087
Rev./ton ($/ton)	24.02	37.67	39.85	82.00
Pacific				
Tons/truckload	11.9	10.8	11.5	11.2
Rev./truckload ($/truckload)	607	433	502	444
Rev./ton ($/ton)	51.01	40.09	43.65	39.54

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-2. MOTOR CARRIER COMMODITY STATISTICS
(coking coal)

	1967	1968	1969	1970
United States				
Tons/truckload	20.4	22.0	21.9	25.0
Rev./truckload ($/truckload)	47	27	28	56
Rev./ton ($/ton)	2.30	1.23	1.28	2.23
Eastern				
Tons/truckload	19.8	22.1	21.9	25.1
Rev./truckload ($/truckload)	43	24	24	51
Rev./ton ($/ton)	2.17	1.08	1.10	2.02
New England				
Tons/truckload	13.0	0.0	7.0	0.0
Rev./truckload ($/truckload)	337	0	41	0
Rev./ton ($/ton)	25.92	0	5.86	0
Mid-Atlantic				
Tons/truckload	19.8	20.9	21.9	29.7
Rev./truckload ($/truckload)	36	40	44	86
Rev./ton ($/ton)	1.82	1.91	2.01	2.91
Central				
Tons/truckload	19.2	22.8	21.9	21.8
Rev./truckload ($/truckload)	196	13	12	25
Rev./ton ($/ton)	10.21	0.55	.55	1.13
Southern				
Tons/truckload	12.2	16.8	20.0	16.1
Rev./truckload ($/truckload)	671	255	233	298
Rev./ton ($/ton)	55	15.18	11.65	18.48
Western				
Tons/truckload	29.8	23.9	20.5	16.6
Rev./truckload ($/truckload)	92	251	226	330
Rev./ton ($/ton)	3.09	10.50	11.02	19.92
Northwest				
Tons/truckload	31.2	26.4	20.8	20.6
Rev./truckload ($/truckload)	68	129	115	221
Rev./ton ($/ton)	2.18	4.89	5.53	10.71
Mid-West				
Tons/truckload	13.2	16.6	15.8	13.4
Rev./truckload ($/truckload)	223	552	680	219
Rev./ton ($/ton)	16.89	33.25	43.04	16.33
Southwest				
Tons/truckload	9.3	15.0	20.7	15.7
Rev./truckload ($/truckload)	289	385	235	361
Rev./ton ($/ton)	31.08	25.67	11.35	23.07
Rocky Mountain				
Tons/truckload	8.0	19.2	12.3	12.3
Rev./truckload ($/truckload)	1201	1699	4718	705
Rev./ton ($/ton)	150.13	88.49	383.58	57.18
Pacific				
Tons/truckload	9.3	19.6	20.4	12.5
Rev./truckload ($/truckload)	420	264	265	534
Rev./ton ($/ton)	45.16	13.47	12.99	42.74

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-3. MOTOR CARRIER COMMODITY STATISTICS
(coke)

	1967	1968	1969	1970
United States				
Tons/truckload	18.4	18.6	18.6	19.1
Rev./truckload ($/truckload)	166	184	197	235
Rev./ton ($/ton)	9.02	9.89	10.59	12.26
Eastern				
Tons/truckload	18.4	18.7	18.7	19.3
Rev./truckload ($/truckload)	165	173	178	179
Rev./ton ($/ton)	8.97	9.25	9.52	9.29
New England				
Tons/truckload	12.5	20.0	0	9.3
Rev./truckload ($/truckload)	411	233	0	269
Rev./ton ($/ton)	32.88	11.65	0	29.03
Mid-Atlantic				
Tons/truckload	19.4	17.2	17.9	17.3
Rev./truckload ($/truckload)	233	235	260	351
Rev./ton ($/ton)	12.01	13.66	14.53	20.36
Central				
Tons/truckload	18.2	19.0	18.9	19.4
Rev./truckload ($/truckload)	146	157	157	172
Rev./ton ($/ton)	8.02	8.26	8.31	8.88
Southern				
Tons/truckload	12.0	18.7	19.4	19.0
Rev./truckload ($/truckload)	238	871	1106	1162
Rev./ton ($/ton)	19.83	46.58	58.21	61.23
Western				
Tons/truckload	10.3	15.7	11.9	15.6
Rev./truckload ($/truckload)	433	321	243	228
Rev./ton ($/ton)	42.04	20.45	20.42	14.62
Northwest				
Tons/truckload	13.8	16.7	10.1	13.7
Rev./truckload ($/truckload)	214	282	105	439
Rev./ton ($/ton)	15.51	16.89	10.40	32.12
Mid-West				
Tons/truckload	12.0	9.8	10.4	19.5
Rev./truckload ($/truckload)	2031	334	294	208
Rev./ton ($/ton)	169.25	34.08	28.27	10.71
Southwest				
Tons/truckload	7.5	10.4	8.3	6.0
Rev./truckload ($/truckload)	780	490	324	132
Rev./ton ($/ton)	104	47.12	39.04	21.93
Rocky Mountain				
Tons/truckload	7.3	16.3	0	12.6
Rev./truckload ($/truckload)	332	808	0	464
Rev./ton ($/ton)	45.5	49.57	0	36.90
Pacific				
Tons/truckload	10.5	10.3	13.4	8.6
Rev./truckload ($/truckload)	370	264	230	195
Rev./ton ($/ton)	35.24	25.63	17.16	22.71

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970

Table D-4. MOTOR CARRIER COMMODITY STATISTICS
(pig iron)

	1967	1968	1969	1970
United States				
Tons/truckload	19.0	19.2	18.9	18.8
Rev./truckload ($/truckload)	232	227	248	297
Rev./ton ($/ton)	12.21	11.82	13.12	15.84
Eastern				
Tons/truckload	19.4	19.4	19.2	18.7
Rev./truckload ($/truckload)	224	223	247	305
Rev./ton ($/ton)	11.55	11.49	12.86	16.31
New England				
Tons/truckload	11.2	8.7	3.0	12.8
Rev./truckload ($/truckload)	157	204	182	231
Rev./ton ($/ton)	14.02	23.45	60.67	18.07
Mid-Atlantic				
Tons/truckload	20.9	21.2	20.2	21.4
Rev./truckload ($/truckload)	151	153	168	179
Rev./ton ($/ton)	7.22	7.22	8.32	8.36
Central				
Tons/truckload	18.7	19.1	19.0	18.1
Rev./truckload ($/truckload)	267	239	272	331
Rev./ton ($/ton)	14.28	12.51	14.32	18.25
Southern				
Tons/truckload	15.3	14.6	14.9	20.2
Rev./truckload ($/truckload)	377	382	320	220
Rev./ton ($/ton)	24.64	26.16	21.48	10.85
Western				
Tons/truckload	15.3	17.1	15.1	17.7
Rev./truckload ($/truckload)	259	243	194	288
Rev./ton ($/ton)	16.93	14.21	12.85	16.23
Northwest				
Tons/truckload	15.7	16.8	16.7	19.0
Rev./truckload ($/truckload)	262	253	202	299
Rev./ton ($/ton)	16.69	15.06	12.10	15.75
Mid-West				
Tons/truckload	12.3	14.4	10.2	14.9
Rev./truckload ($/truckload)	180	150	148	322
Rev./ton ($/ton)	14.63	10.42	14.51	21.66
Southwest				
Tons/truckload	12.0	25.4	13.7	14.4
Rev./truckload ($/truckload)	387	334	199	374
Rev./ton ($/ton)	32.25	13.15	14.53	26.04
Rocky Mountain				
Tons/truckload	16.5	18.6	17.0	13.5
Rev./truckload ($/truckload)	905	293	417	780
Rev./ton ($/ton)	54.85	15.75	24.53	57.70
Pacific				
Tons/truckload	16.1	17.6	15.0	17.3
Rev./truckload ($/truckload)	194	180	186	131.20
Rev./ton ($/ton)	12.05	10.23	12.40	7.59

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970

Table D-5. MOTOR CARRIER COMMODITY STATISTICS
(scrap iron and steel)

	1967	1968	1969	1970
United States				
Tons/truckload	18.9	19.5	19.5	19.9
Rev./truckload ($/truckload)	195	197	220	267
Rev./ton ($/ton)	10.32	10.10	11.28	13.42
Eastern				
Tons/truckload	19.4	19.5	19.5	20.7
Rev./truckload ($/truckload)	165	164	197	258
Rev./ton ($/ton)	8.51	8.41	10.10	12.44
New England				
Tons/truckload	14.6	16.5	15.3	16.0
Rev./truckload ($/truckload)	259	241	307	293
Rev./ton ($/ton)	17.74	14.61	20.07	18.34
Mid-Atlantic				
Tons/truckload	17.3	10.6	15.4	17.0
Rev./truckload ($/truckload)	161	156	232	278
Rev./ton ($/ton)	9.31	14.72	15.06	16.35
Central				
Tons/truckload	21.4	21.8	22.5	24.4
Rev./truckload ($/truckload)	164	166	177	240
Rev./ton ($/ton)	7.66	7.61	7.87	10.04
Southern				
Tons/truckload	17.3	16.3	15.6	16.1
Rev./truckload ($/truckload)	312	312	326	359
Rev./ton ($/ton)	18.03	19.14	20.90	22.37
Western				
Tons/truckload	15.9	16.2	17.6	17.1
Rev./truckload ($/truckload)	336	368	314	280
Rev./ton ($/ton)	24.28	22.72	17.84	16.42
Northwest				
Tons/truckload	14.9	15.0	16.1	15.8
Rev./truckload ($/truckload)	205	219	234	238
Rev./ton ($/ton)	13.76	13.93	14.53	15.08
Mid-West				
Tons/truckload	12.0	14.8	14.9	15.1
Rev./truckload ($/truckload)	215	240	234	310
Rev./ton ($/ton)	17.92	16.22	15.70	20.48
Southwest				
Tons/truckload	19.4	18.5	18.4	15.7
Rev./truckload ($/truckload)	739	627	791	313
Rev./ton ($/ton)	38.09	33.89	42.99	19.94
Rocky Mountain				
Tons/truckload	16.5	14.4	19.3	18.9
Rev./truckload ($/truckload)	261	260	231	241
Rev./ton ($/ton)	15.82	18.06	11.97	12.75
Pacific				
Tons/truckload	15.0	15.2	18.6	18.4
Rev./truckload ($/truckload)	215	143	208	288
Rev./ton ($/ton)	14.33	9.41	11.18	15.63

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-6. MOTOR CARRIER COMMODITY STATISTICS
(pulp)

	1967	1968	1969	1970
United States				
Tons/truckload	19.8	19.4	18.0	20.6
Rev./truckload ($/truckload)	149	147	110	105
Rev./ton ($/ton)	7.52	7.58	6.11	5.10
Eastern				
Tons/truckload	12.0	14.4	15.9	18.3
Rev./truckload ($/truckload)	304	224	253	216
Rev./ton ($/ton)	25.33	15.56	15.91	11.80
New England				
Tons/truckload	15.2	24.8	24.3	22.7
Rev./truckload ($/truckload)	207	244	170	98
Rev./ton ($/ton)	13.62	9.84	7	4.31
Mid-Atlantic				
Tons/truckload	11.8	12.5	12.5	13.7
Rev./truckload ($/truckload)	152	205	249	310
Rev./ton ($/ton)	12.88	16.40	19.92	22.63
Central				
Tons/truckload	12.8	13.1	15.3	15.6
Rev./truckload ($/truckload)	1775	401	418	541
Rev./ton ($/ton)	138.67	30.61	27.32	34.64
Southern				
Tons/truckload	12.7	15.3	12.6	16.6
Rev./truckload ($/truckload)	281	420	144	143
Rev./ton ($/ton)	22.13	27.45	11.43	8.59
Western				
Tons/truckload	22.5	22.1	19.1	21.6
Rev./truckload ($/truckload)	94	95	68	80
Rev./ton ($/ton)	4.18	4.30	3.56	3.71
Northwest				
Tons/truckload	13.5	14.3	14.8	15.5
Rev./truckload ($/truckload)	294	357	307	194
Rev./ton ($/ton)	21.78	24.97	20.74	12.47
Mid-West				
Tons/truckload	5.0	9.8	8.6	10.0
Rev./truckload ($/truckload)	623	430	234	288
Rev./ton ($/ton)	125	43.87	27.21	28.72
Southwest				
Tons/truckload	20.9	19.5	21.6	18.0
Rev./truckload ($/truckload)	88	87	100	94
Rev./ton ($/ton)	4.21	4.46	4.63	5.23
Rocky Mountain				
Tons/truckload	43.9	35.5	26.1	27.9
Rev./truckload ($/truckload)	459	387	353	426
Rev./ton ($/ton)	10.46	10.90	13.52	15.25
Pacific				
Tons/truckload	24.4	24.9	17.9	23.2
Rev./truckload ($/truckload)	78	79	47	67
Rev./ton ($/ton)	3.20	3.17	2.63	2.91

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-7. MOTOR CARRIER COMMODITY STATISTICS
(roundwood)

	1967	1968	1969	1970
United States				
Tons/truckload	13.3	13.2	15.8	15.6
Rev./truckload ($/truckload)	230	307	447	386
Rev./ton ($/ton)	17.29	23.26	28.29	24.76
Eastern				
Tons/truckload	12.9	12.6	14.5	14.6
Rev./truckload ($/truckload)	235	245	442	342
Rev./ton ($/ton)	18.22	19.44	30.48	23.47
New England				
Tons/truckload	15.4	17.1	19	12.0
Rev./truckload ($/truckload)	207	285	262	176
Rev./ton ($/ton)	13.44	16.67	13.79	14.67
Mid-Atlantic				
Tons/truckload	16.2	10.8	13.5	14.3
Rev./truckload ($/truckload)	314	248	396	334
Rev./ton ($/ton)	19.38	22.96	29.33	23.41
Central				
Tons/truckload	9.36	11.7	20.3	17.8
Rev./truckload ($/truckload)	181	196	757	431
Rev./ton ($/ton)	19.34	16.75	37.29	24.15
Southern				
Tons/truckload	13.8	16.1	17.1	16.9
Rev./truckload ($/truckload)	233	302	473	489
Rev./ton ($/ton)	16.88	18.76	27.66	29.00
Western				
Tons/truckload	13.5	14.0	16.2	16.8
Rev./truckload ($/truckload)	223	526	391	265
Rev./ton ($/ton)	16.52	37.57	24.14	15.76
Northwest				
Tons/truckload	13.2	16.4	16.9	17.6
Rev./truckload ($/truckload)	271	903	341	416
Rev./ton ($/ton)	20.53	55.06	20.18	23.58
Mid-West				
Tons/truckload	0	9.5	10.7	17.5
Rev./truckload ($/truckload)	0	123	202	310
Rev./ton ($/ton)	0	12.95	18.88	17.69
Southwest				
Tons/truckload	17.7	0	0	0
Rev./truckload ($/truckload)	133	0	0	0
Rev./ton ($/ton)	7.5	0	0	0
Rocky Mountain				
Tons/truckload	12.2	11.5	13.4	12
Rev./truckload ($/truckload)	351	146	534	275
Rev./ton ($/ton)	28.77	12.70	39.85	22.92
Pacific				
Tons/truckload	13.4	13.0	17.2	16.9
Rev./truckload ($/truckload)	178	282	403	208
Rev./ton ($/ton)	13.28	21.69	23.43	12.33

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-8. MOTOR CARRIER COMMODITY STATISTICS
(wood chips and residues)

	1967	1968	1969	1970
United States				
Tons/truckload	21.6	22.5	24.6	22.1
Rev./truckload ($/truckload)	34	39	44	54
Rev./ton ($/ton)	1.59	1.74	1.79	2.44
Eastern				
Tons/truckload	20.3	18.3	112.5	16.3
Rev./truckload ($/truckload)	130	188	208	228
Rev./ton ($/ton)	6.40	10.30	1.85	13.99
New England				
Tons/truckload	21.3	18.7	13.8	16.9
Rev./truckload ($/truckload)	105	157	226	223
Rev./ton ($/ton)	4.92	8.39	16.39	13.18
Mid-Atlantic				
Tons/truckload	20.8	18.4	169.8	15.7
Rev./truckload ($/truckload)	151	193	201	238
Rev./ton ($/ton)	7.25	10.48	1.18	15.15
Central				
Tons/truckload	11.57	13.7	13.6	13.1
Rev./truckload ($/truckload)	240	283	200	252
Rev./ton ($/ton)	20.74	20.70	14.66	19.30
Southern				
Tons/truckload	22.8	22.5	23.0	22.4
Rev./truckload ($/truckload)	54	67	59	61
Rev./ton ($/ton)	2.36	2.97	2.58	2.72
Western				
Tons/truckload	21.6	22.6	23.2	22.1
Rev./truckload ($/truckload)	33	36	41	52
Rev./ton ($/ton)	1.53	1.58	1.76	2.37
Northwest				
Tons/truckload	12.1	12.0	11.1	13.7
Rev./truckload ($/truckload)	257	220	312	254
Rev./ton ($/ton)	21.29	18.38	28.05	18.53
Mid-West				
Tons/truckload	9.4	9.1	9.0	8.6
Rev./truckload ($/truckload)	256	250	244	266
Rev./ton ($/ton)	27.19	27.54	27.06	31.05
Southwest				
Tons/truckload	21.0	23.4	23.5	21.3
Rev./truckload ($/truckload)	16	19	16	17
Rev./ton ($/ton)	.77	.82	.69	.78
Rocky Mountain				
Tons/truckload	36.1	23.4	10.0	21.8
Rev./truckload ($/truckload)	405	318	221	455
Rev./ton ($/ton)	11.23	13.57	22.12	20.85
Pacific				
Tons/truckload	22.3	22.5	23.4	22.5
Rev./truckload ($/truckload)	41	39	43	56
Rev./ton ($/ton)	1.81	1.73	1.85	2.52

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

Table D-9. MOTOR CARRIER COMMODITY STATISTICS
(wastepaper)

	1967	1968	1969	1970
United States				
Tons/truckload	17.7	16.6	16.0	13.2
Rev./truckload ($/truckload)	244	133	166	128
Rev./ton ($/ton)	13.79	8.01	10.38	9.68
Eastern				
Tons/truckload	17.4	15.8	15.0	14.9
Rev./truckload ($/truckload)	153	120	136	126
Rev./ton ($/ton)	8.79	7.59	9.07	8.44
New England				
Tons/truckload	13.9	14.4	14.0	16.7
Rev./truckload ($/truckload)	198	183	196	219
Rev./ton ($/ton)	14.24	12.71	14	13.13
Mid-Atlantic				
Tons/truckload	15.1	13.5	14.0	14.2
Rev./truckload ($/truckload)	203	116	161	105
Rev./ton ($/ton)	13.44	8.59	11.50	7.41
Central				
Tons/truckload	18.5	17.5	15.7	15.4
Rev./truckload ($/truckload)	131	119	120	134
Rev./ton ($/ton)	7.08	6.80	7.64	8.71
Southern				
Tons/truckload	14.3	15.3	15.1	16.6
Rev./truckload ($/truckload)	88	106	187	223
Rev./ton ($/ton)	6.15	6.93	12.38	13.43
Western				
Tons/truckload	19.3	18.7	17.3	11.2
Rev./truckload ($/truckload)	144	171	191	111
Rev./ton ($/ton)	7.46	9.14	11.04	9.84
Northwest				
Tons/truckload	14.1	17.4	19.5	18.6
Rev./truckload ($/truckload)	178	214	206	190
Rev./ton ($/ton)	12.62	12.30	10.56	10.20
Mid-West				
Tons/truckload	17.3	15.7	12.9	11.1
Rev./truckload ($/truckload)	133	188	183	211
Rev./ton ($/ton)	7.69	11.97	14.19	19.10
Southwest				
Tons/truckload	24.0	15.5	16.8	13.7
Rev./truckload ($/truckload)	693	198	241	250
Rev./ton ($/ton)	28.88	12.77	14.35	18.18
Rocky Mountain				
Tons/truckload	18.3	17.0	16.2	17.6
Rev./truckload ($/truckload)	247	168	287	333
Rev./ton ($/ton)	13.50	9.88	17.72	18.89
Pacific				
Tons/truckload	19.8	19.1	17.0	9.9(
Rev./truckload ($/truckload)	110	167	179	87
Rev./ton ($/ton)	5.56	8.74	10.53	8.69

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, years 1967-1970.

APPENDIX E

MAPS INDICATING VARYING RAILROAD AND MOTOR CARRIER TERRITORIES, DISTRICTS AND REGIONS AND A MAP OF THE WATERWAYS OF THE UNITED STATES

Railroad Districts Defined for Freight Commodity Statistics

Those districts for which railroad freight statistics were gathered cannot be defined according to state but rather according to the movements of the railroads themselves. The following list indicates which railroads are categorized in each district for data-gathering purposes:

Eastern District:

Akron, Canton & Youngstown
Ann Arbor
Baltimore & Ohio
Bangor & Aroostook
Bessemer & Lake Erie
Boston & Maine
Canadian Pacific Lines in Maine
Central R. R. Co. of New Jersey
Central Vermont
Chesapeake & Ohio
Chicago & Eastern Illinois
Delaware & Hudson
Detroit & Toledo Shore Line
Detroit, Toledo & Ironton
Elgin, Joliet & Eastern
Erie Lackawanna
Grand Trunk Western
Illinois Terminal
Lehigh Valley
Long Island
Maine Central
Missouri-Illinois
Monongahela
Norfolk & Western
Penn Central Transportation
Pennsylvania-Reading Seashore Lines
Pittsburgh & Lake Erie
Reading
Richmond, Fredericksburg & Potomac
Western Maryland

Southern District:

Alabama Great Southern
Central of Georgia
Cincinnati, New Orleans & Texas Pacific
Clinchfield
Florida East Coast
Georgia
Georgia Southern & Florida
Gulf, Mobile & Ohio
Illinois Central
Louisville & Nashville
Norfolk Southern
Seaboard Coast Line
Southern

Western District:

Atchison, Topeka & Santa Fe
Burlington Northern Inc.
Chicago & North Western
Chicago, Milwaukee, St. Paul & Pacific
Chicago, Rock Island & Pacific
Colorado & Southern
Denver & Rio Grande Western
Duluth, Missabe & Iron Range
Duluth, Winnipeg & Pacific
Fort Worth & Denver
Green Bay & Western
Kansas City Southern
Lake Superior & Ishpeming
Missouri-Kansas-Texas
Missouri Pacific
Northwestern Pacific
Oregon Electric
St. Louis-San Francisco
St. Louis Southwestern
Soo Line
Southern Pacific Transportation
Texas & Pacific
Toledo, Peoria & Western
Union Pacific
Western Pacific

Territories Defined for American Paper Institute Mill Receipt Survey

Western Official:

Ohio
Illinois
Indiana
Michigan
Wisconsin

Eastern Official:

Massachusetts
Pennsylvania
Delaware
New Jersey
New York
Washington, D.C.
Maryland

Mountain-Pacific:

California
Washington
Oregon

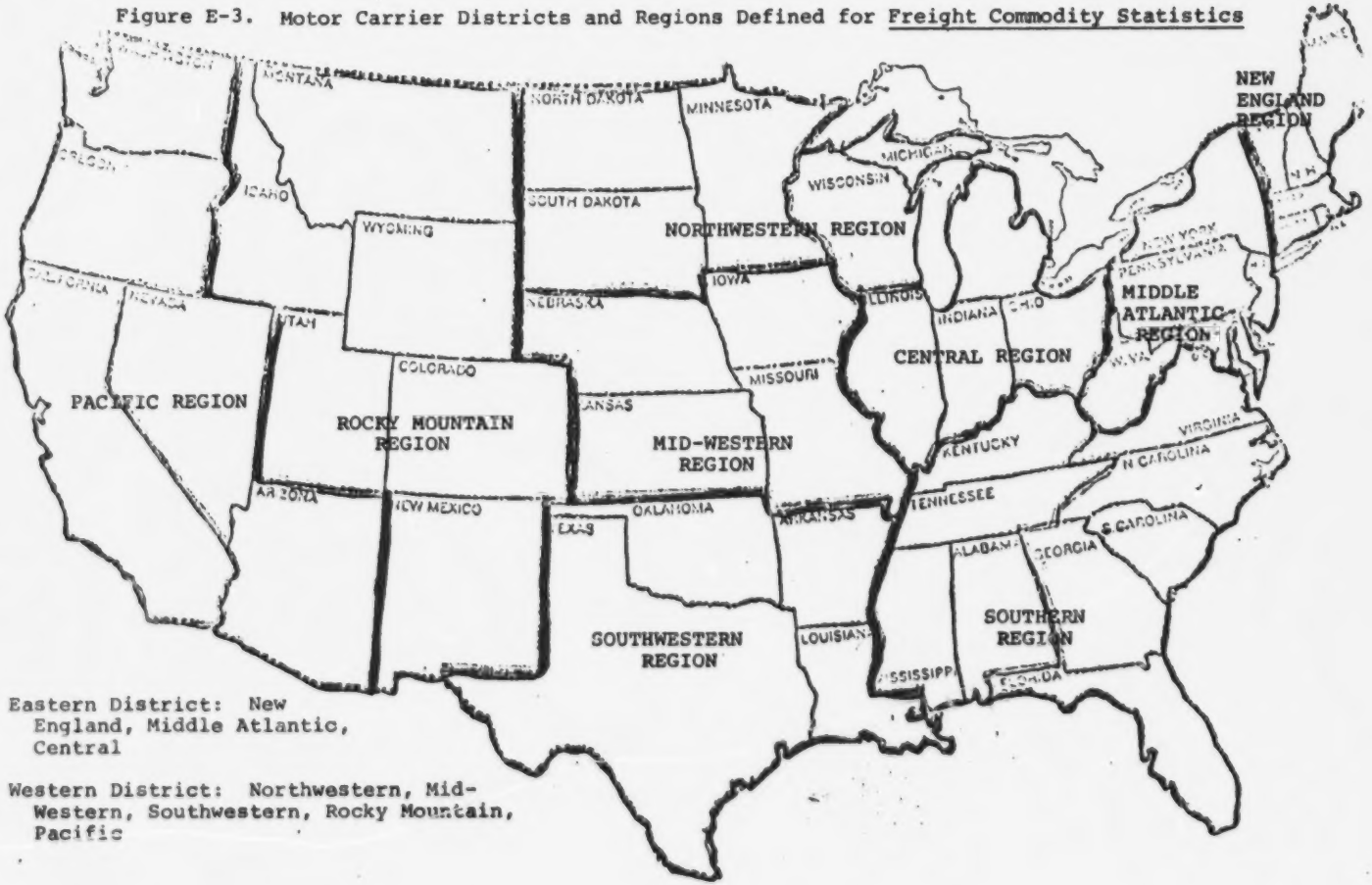
Southern:

Tennessee
North Carolina
Georgia

Figure E-1. Railroad Territories Defined for Carload Waybill Statistics 1966

Figure E-2. Railroad Territories Defined for Carload Waybill Statistics 1969

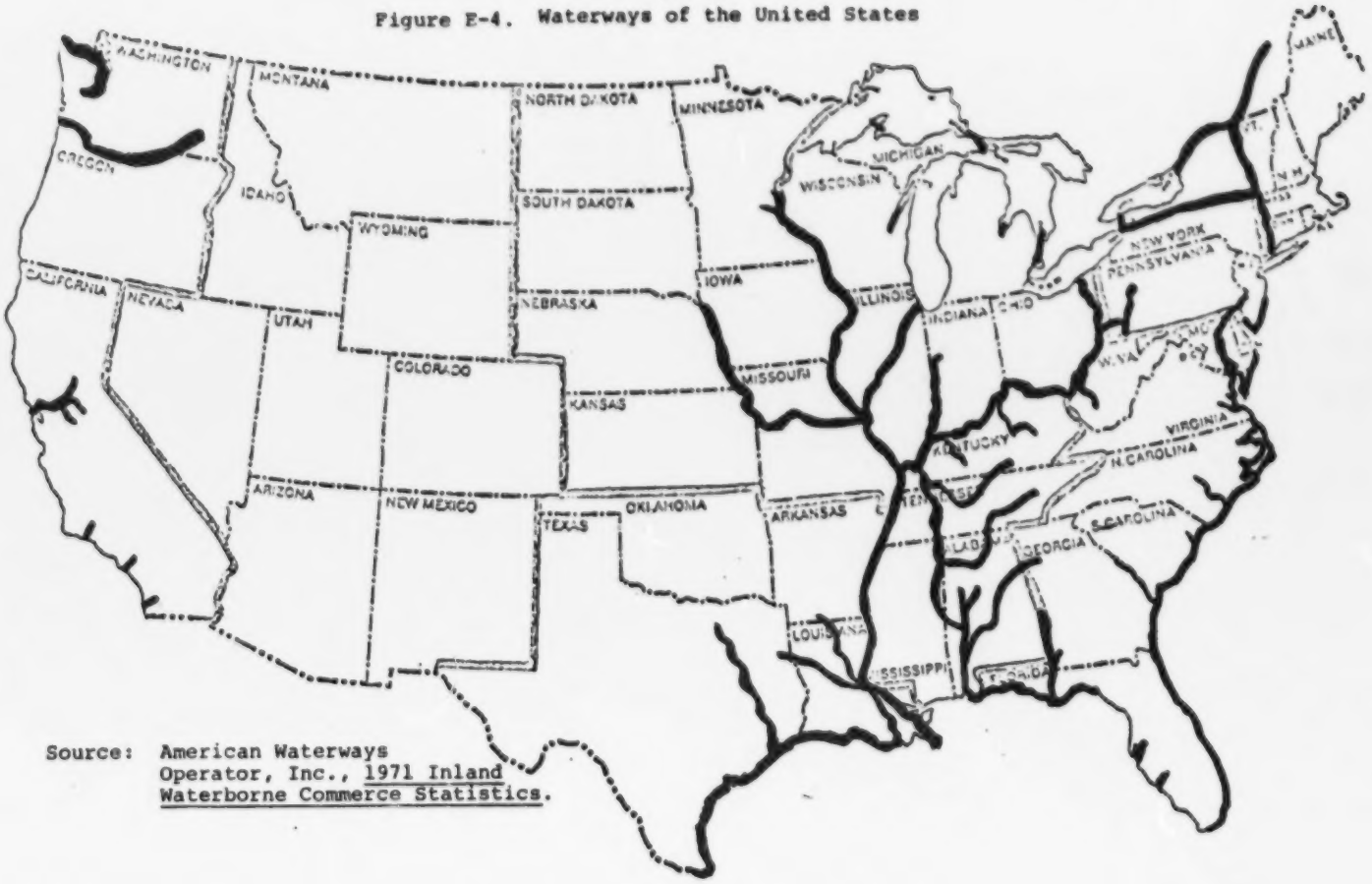
Figure E-3. Motor Carrier Districts and Regions Defined for Freight Commodity Statistics



Eastern District: New England, Middle Atlantic, Central

Western District: Northwestern, Mid-Western, Southwestern, Rocky Mountain, Pacific

Figure E-4. Waterways of the United States



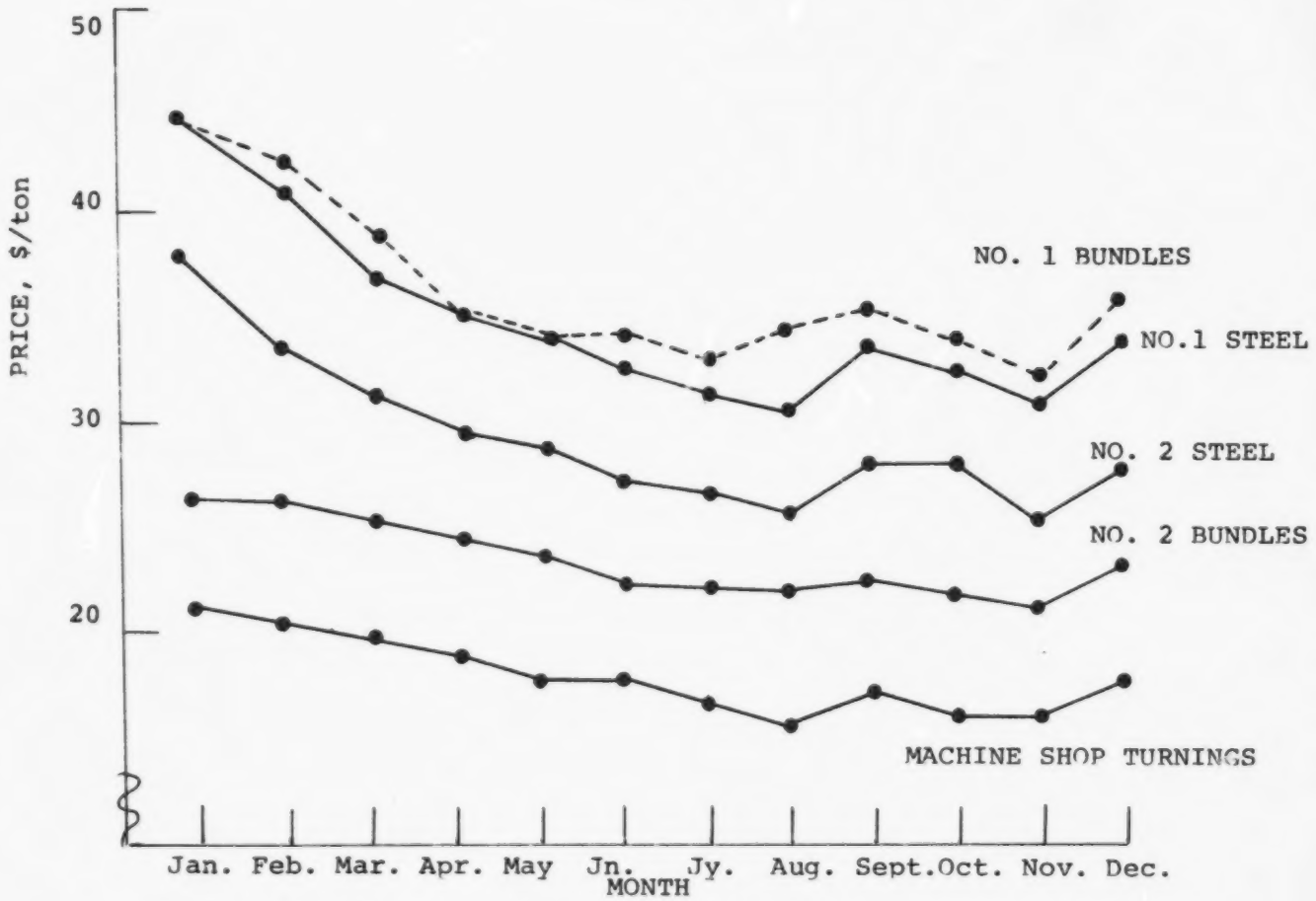
Source: American Waterways Operator, Inc., 1971 Inland Waterborne Commerce Statistics.

APPENDIX F

COMMODITY PRICE GRAPHS

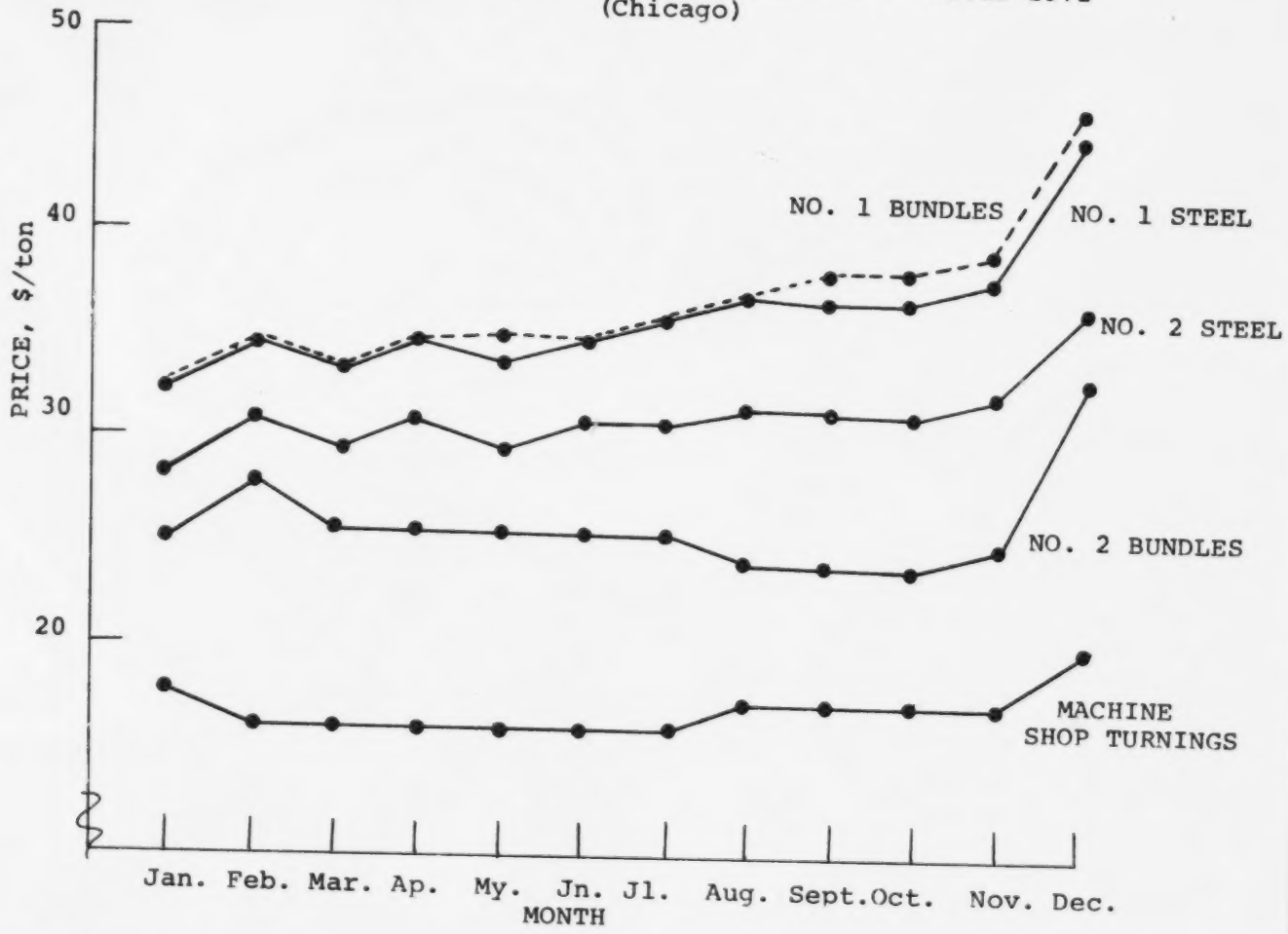
Graphs have been drawn to illustrate the monthly variation of scrap iron and steel and wastepaper prices for years 1971 and 1972. These are an indication of the uncertainty, due to cost, in scrap prices.

Figure F-1. Monthly Average Scrap Iron and Steel Prices-1971 (Chicago)



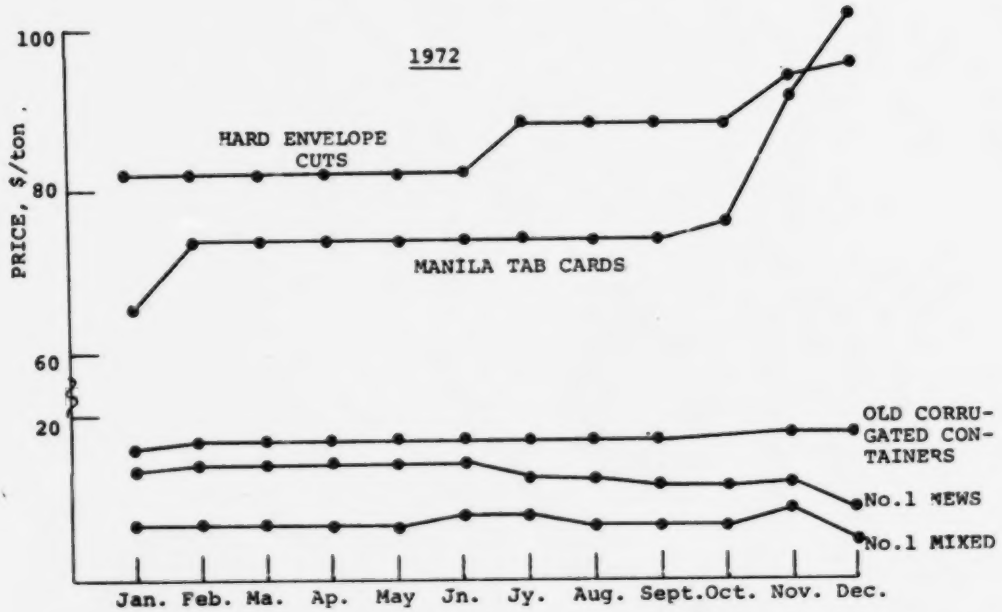
Source: Iron Age, January-December, 1971

Figure F-2. Monthly Average Scrap Iron and Steel Prices-1972
(Chicago)

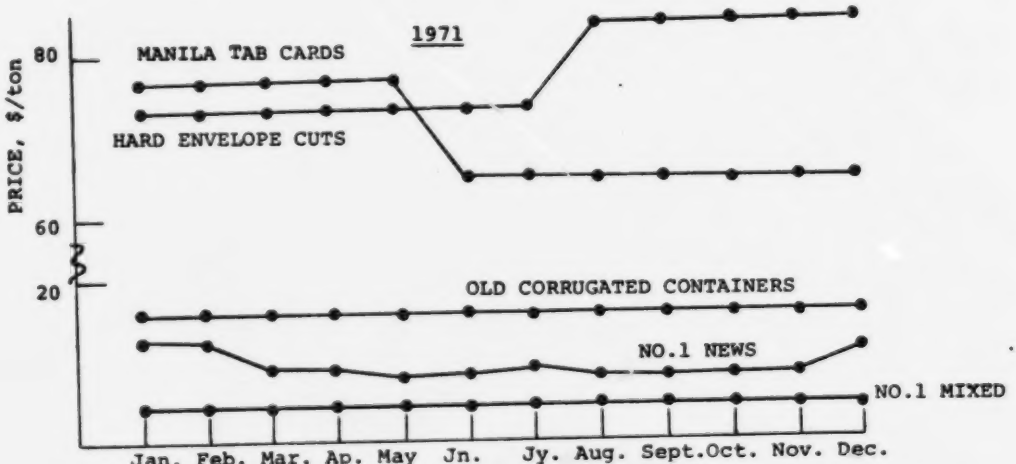


Source: Iron Age, January-December, 1972.

Figure F-3. Monthly Average Wastepaper Prices
(New York)



Source: Paper Trade Journal, January-December, 1972.



Source: Paper Trade Journal, January-December 1971.

APPENDIX - CHAPTER IV

The appendix to Chapter IV contains the questionnaire sent to steel industry executives requesting information pertinent to this study. (A comparable questionnaire was also sent to paper industry executives.) Also included are tables supplementary to observations in the Chapter and the entire collection of Carload Waybill data for 1966.

Steel Mill Transportation Questionnaire

1. How many steel mills does your company operate? How many of these facilities are integrated operations?

2. Where are each of the steel mills located? Differentiate between integrated and non-integrated facilities.

3. On average, how many tons of the following raw materials does each mill use per day?

Consumption of Raw Materials (tons/day)

Mill:	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

4. Where are the primary sources of the following raw materials located for each mill? What are the distances between these source points and the appropriate consuming mill?

(See next page.)

Question 4.

Location and Distance from Consuming Mill of Primary Raw Material Sources

	Mill #1	Mill #2	Mill #3	Mill #4	Mill #5	Mill #6	Mill #7	Mill #8	Mill #9	Mill #10
Scrap Iron and Steel										
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

5. Are there any common routes over which scrap and iron ore move into your mills? If these common routes exist please include them in the location and distance matrix given in question 4.

6. When your normal suppliers are experiencing shortages, where are your alternative suppliers located? What are the distances between these alternative supply points and the consuming mills?

7. What modes of transportation are used to move the following raw materials into your plant? What proportion of each material moves on a given transport mode?

	Mill #1	Mill #2	Mill #3	Mill #4	Mill #5	Mill #6	Mill #7	Mill #8	Mill #9	Mill #10
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

8. What is the average shipping time for each of the following raw materials for each transportation mode?

MILL:	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

9. Who are the primary carriers who move the following materials into the consuming mills? What is the size (in terms of number of trucks, revenues, etc.) of each carrier? How has the carrier mix changed in recent years?

Carriers and Carrier Size

	Mill #1	Mill #2	Mill #3	Mill #4	Mill #5	Mill #6	Mill #7	Mill #8	Mill #9	Mill #10
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

10. What are the rates charged by each carrier for moving the following materials into the consuming mills? How do these rates vary with haul distance and weight per load? If your company provides its own transportation services give estimates for the cost incurred in hauling the indicated commodities. How have the rates been changing in recent years?

	Mill #1	Mill #2	Mill #3	Mill #4	Mill #5	Mill #6	Mill #7	Mill #8	Mill #9	Mill #10
Scrap Iron and Steel										
Iron Ore										
Coking Coal and Limestone										

11. How have these rates been established (fixed by government agencies, negotiated, etc.)? Give some examples of how your company has participated in the establishment of these rates. Be specific as to what variables (i.e. operating costs, competition, value of the commodity, etc.) were important in establishing these rates.

12. If your company provides the incoming transportation for the raw materials listed in question 10, how does the company establish a cost of transporting these materials? Why has the company decided to use "in house" transportation rather than "for hire" transport services?

13. What types of vehicles or cars are used to transport the materials listed in question 10? What are the weight and volume capacities for these vehicles or cars? What are the state or federal maximum load limits over your primary routes?

14. What methods and equipment are used to load and unload the various vehicles and cars given in question 13? Has new technology changed these methods or equipment in recent years?

Table 4-18. RAW STEEL PRODUCTION BY TYPE OF FURNACE

Amount and Percentage of Total Production
Produced by Three Primary Types of Furnaces

	Open hearth		Basic oxygen		Electric	
YEAR	Thousands of net tons	% of total production	Thousands of net tons	% of total production	Thousands of net tons	% of total production
1971	35559	29.5	63943	53.1	20941	17.4
1970	48022	36.5	63330	48.2	20162	15.3
1969	60894	43.1	60236	42.6	20132	14.3
1968	65836	50.1	48812	37.1	16814	12.8
1967	70690	55.6	41434	32.6	15089	11.9

Source: American Iron and Steel Institute, Annual Statistical Report, 1971, Table 26.

Table 4-19. OPEN HEARTH AND BLAST FURNACE RAW STEEL PRODUCTION
(thousands of tons)

	1969	1970	1975 (projected)	1980 (projected)
Open hearth furnace:				
Production-raw steel	60894	48022	30000	15000
Inputs-pig iron & steel	67649	52771	33300	16700
Yield (production as % of inputs)	90.0	91.0	90.1	89.8
Pig iron inputs	37397	30836	18300	9200
Scrap inputs (total)	30252	21935	15000	7500
Home	21340	17144	10700	5800
Purchased	8912	4791	4300	1700
Blast furnace:				
Production	95017	91435	---	---
Inputs				
Scrap (total)	4779	5302	4800	5500
Home	873	886	1100	1600
Purchased	3906	4416	3700	3900

Source: Economic and Technological Impediments to Recycling Obsolete Ferrous Solid Waste, published manuscript by Oscar W. Albrecht and Richard G. McDermott, Solid Waste Research Laboratory, National Environmental Research Center, Cincinnati, Ohio, 1973.

Table 4-20. BASIC OXYGEN FURNACE RAW STEEL PRODUCTION
(thousands of tons)

	1969	1970	1975 (projected)	1980 (projected)
Production-raw steel	60236	63330	82000	105000
Inputs-pig iron & scrap	66236	69977	90500	116000
Yield (production as % of inputs)	90.9	90.5	90.6	90.5
Pig iron inputs	46408	48853	63200	81200
Scrap input (total)	19828	21124	27300	34800
Home	20350	21627	28300	36100
Purchased	-522	-503	-1000	-1300

Source: Economic and Technological Impediments to Recycling Obsolete Ferrous Solid Waste, published manuscript by Oscar W. Albrecht and Richard G. McDermott, Solid Waste Research Laboratory, National Environmental Research Center, Cincinnati, Ohio, 1973.

Table 4-21. ELECTRIC FURNACE RAW STEEL PRODUCTION
(thousands of tons)

	1969	1970	1975 (projected)	1980 (projected)
Production-raw steel	20132	20162	32000	45000
Inputs-pig iron & scrap	19788	21300	33000	46500
Yield (production as % of inputs)	101.7	94.7	97.0	96.7
Pig iron inputs	213	2466	700	900
Scrap input (total)	19575	18834	32300	45600
Home	6630	6702	11400	16600
Purchased	12945	12132	20900	29000

Source: Economic and Technological Impediments to Recycling Obsolete Ferrous Solid Waste, published manuscript by Oscar W. Albrecht and Richard G. McDermott, Solid Waste Research Laboratory, National Environmental Research Center, Cincinnati, Ohio, 1973.

Table 4-22. FOUNDRY SHIPMENTS
(thousands of tons)

	1969	1970	1975 (projected)	1980 (projected)
Shipments	18984	16529	19000	21000
Inputs	---	---	---	---
Pig Iron	---	---	---	---
Scrap (total)	18175	15895	18200	20200
Home	7030	6105	7100	8000
Purchased	11145	9790	11100	12200

Source: Economic and Technological Impediments to Recycling Obsolete Ferrous Solid Waste, published manuscript by Oscar W. Albrecht and Richard G. McDermott, Solid Waste Research Laboratory, National Environmental Research Center, Cincinnati, Ohio, 1973.

Table 4-23. PERCENT OF U.S. PIG IRON OR HOT METAL PRODUCED BY STATE - 1971

State	Percent of U.S. Total
Alabama	4.9
California	2.3
Colorado	2.1
Illinois	7.9
Indiana	15.6
Kentucky	2.1
Maryland	4.4
Michigan	8.0
Minnesota	1.0
New York	5.2
Ohio	16.8
Pennsylvania	23.1
Texas	1.1
Utah	1.1
West Virginia	4.4

Source: American Iron & Steel Institute, Annual Statistical Report 1971.

Table 4-24. RAW STEEL PRODUCTION BY STATE

States	Production, thousands of net tons									
	1967	%	1968	%	1969	%	1970	%	1971	%
New York	7298	5.7	7228	5.5	7522	5.3	5824	4.4	4321	3.6
Pennsylvania	29881	23.5	31018	23.6	32791	23.2	30031	22.8	27665	23.0
R.I.,Conn., N.J.,Del., Maryland	8132	6.4	8025	6.1	8949	6.3	8296	6.3	6947	5.8
Va.,W.Va.,Ga., Fla.,N.C., S.C.	4268	3.4	4453	3.4	4674	3.3	4629	3.5	4601	3.8
Kentucky	2410	1.9	2478	1.9	2575	1.8	2378	1.8	2291	1.9
Ala.,Tenn., Miss.,Ark.	4444	3.5	4611	3.5	5115	3.9	5044	3.8	4535	3.8
Ohio	20378	16.0	22606	17.2	24202	17.1	21684	16.5	20064	16.7
Indiana	17610	13.8	17911	13.6	19386	13.7	18528	14.1	17307	14.4
Illinois	10649	8.4	10510	8.0	11873	8.4	11738	8.9	10897	9.0
Michigan	9245	7.3	9218	7.0	10036	7.1	9547	7.3	9069	7.6
Minn.,Mo., Okla.,Texas	4644	3.7	4810	3.7	5300	3.8	5198	4.0	4908	4.1
Ariz.,Ha., Colo.,Utah, Wash.,Ore.	4154	3.3	4384	3.4	4595	3.2	4609	3.5	4253	3.5
California	4100	3.2	4210	3.2	4244	3.0	4008	3.0	3595	3.0
Total	127213		131462		141262		131514		120453	

Source: American Iron and Steel Institute, Annual Statistical Report 1971,Table 27.

Steel raw materials

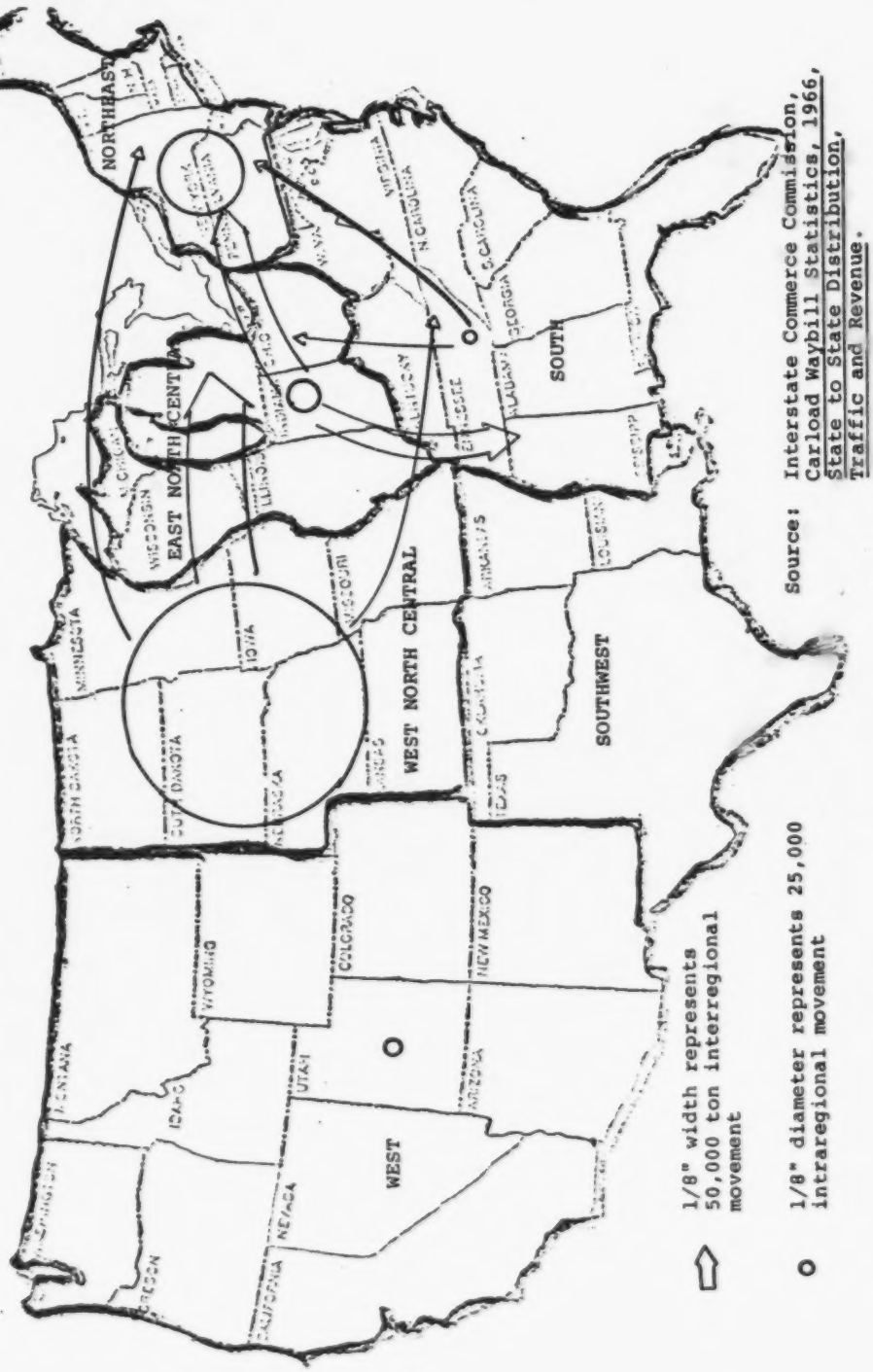

NORTHEAST
EAST NORTH CENTRAL
WEST NORTH CENTRAL
SOUTH
SOUTHWEST
WEST
1/8" width represents 50,000 ton interregional movement
1/8" diameter represents 25,000 intraregional movement
Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

Figure 4-27. Interregional and Intraregional Rail Movements of Iron Ore - 1966

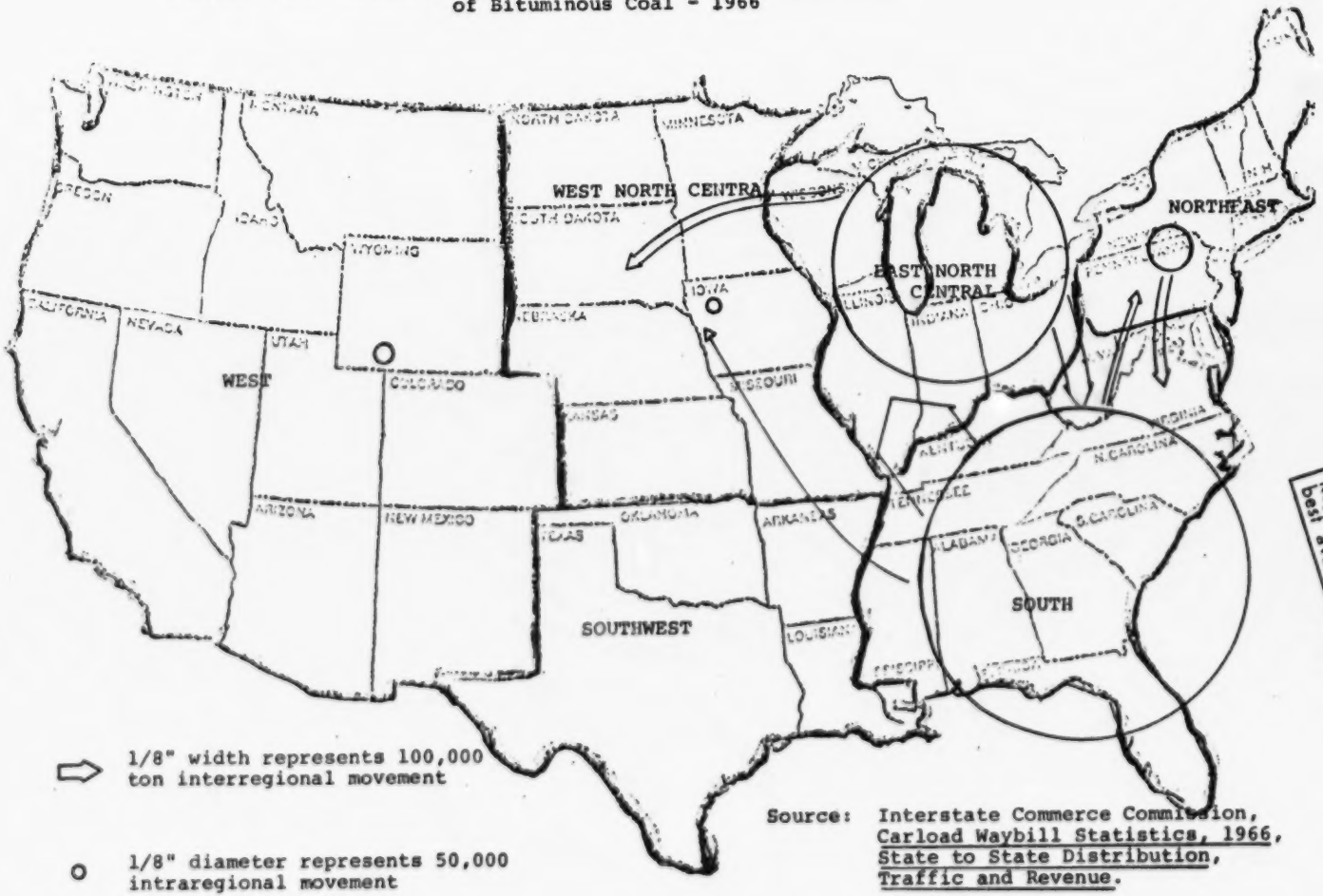
Table 4-25. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF IRON ORE - 1966

Territorial movement	Number of tons
Northeast to Northeast	179,201
Northeast to South	3,238
Northeast to East North Central	10,148
South to South	23,451
South to Northeast	12,871
South to East North Central	821
East North Central to East North Central	81,081
East North Central to Northeast	122,306
East North Central to South	61,833
West North Central to West North Central	307,991
West North Central to East North Central	187,876
West North Central to Northeast	3,356
West North Central to South	1,176
West to West	33,470

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Note: See Appendix E, Figure E-1, for definition of railroad territories.

Figure 4-28. Interregional and Intraregional Rail Movements of Bituminous Coal - 1966



Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

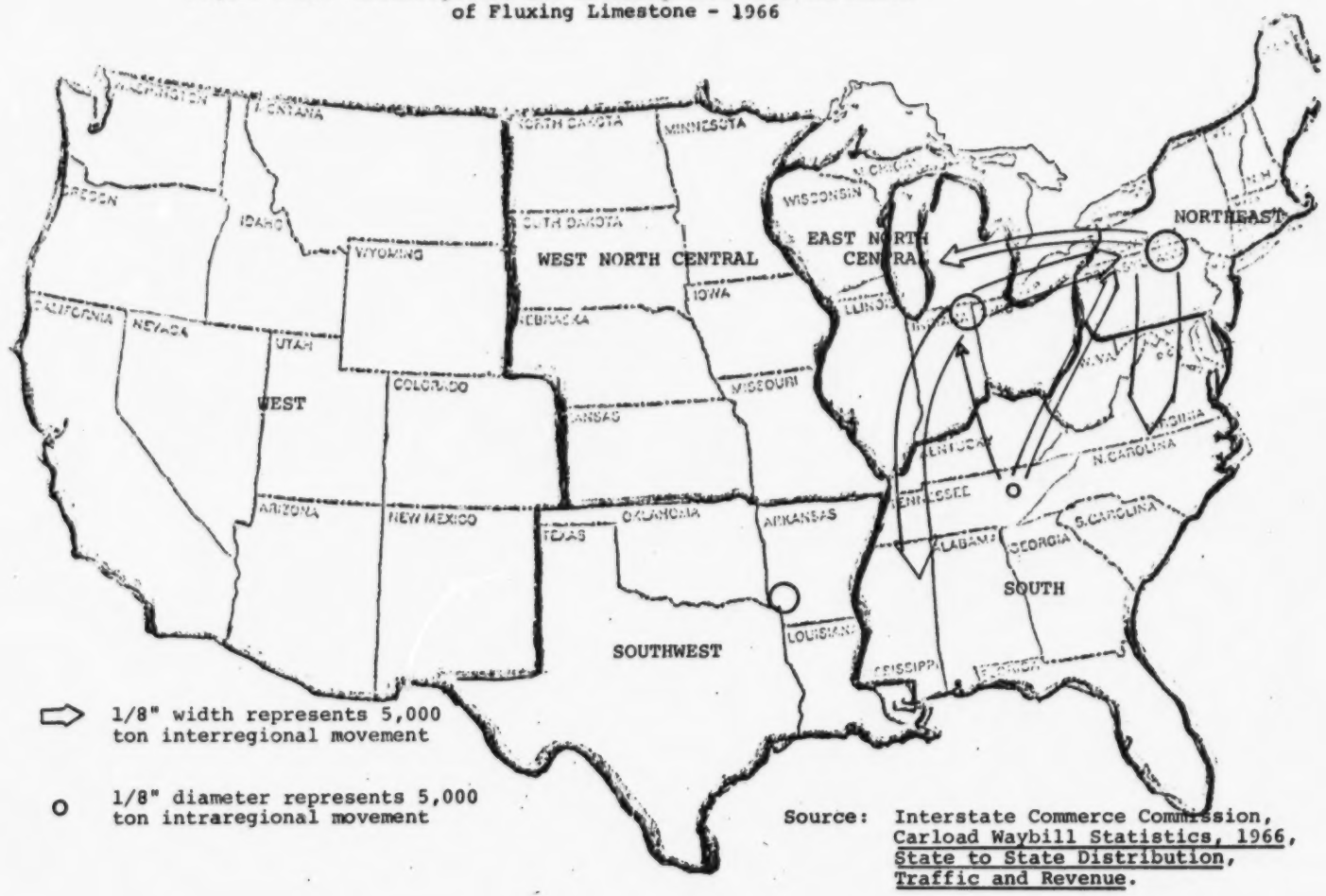
Reproduced from best available copy.

Table 4-26. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF BITUMINOUS COAL-1966

Territorial movement	Number of tons
Northeast to Northeast	252,535
Northeast to South	54,052
South to South	1,199,810
South to Northeast	25,310
South to East North Central	596,680
South to West North Central	3,806
East North Central to East North Central	642,670
East North Central to South	14,232
East North Central to West North Central	50,577
West North Central to West North Central	44,791
West to West	91,197

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Figure 4-29. Interregional and Intraregional Rail Movements of Fluxing Limestone - 1966



Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

Table 4-27. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF FLUXING LIMESTONE-1966

Territorial movement	Number of tons
Northeast to Northeast	23,997
Northeast to South	18,002
Northeast to East North Central	3,286
South to South	4,223
South to Northeast	3,533
South to East North Central	708
East North Central to East North Central	19,858
East North Central to Northeast	10,120
East North Central to South	13,507
Southwest to Southwest	14,918

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Figure 4-30. Interregional and Intraregional Rail Movements of Coke - 1966

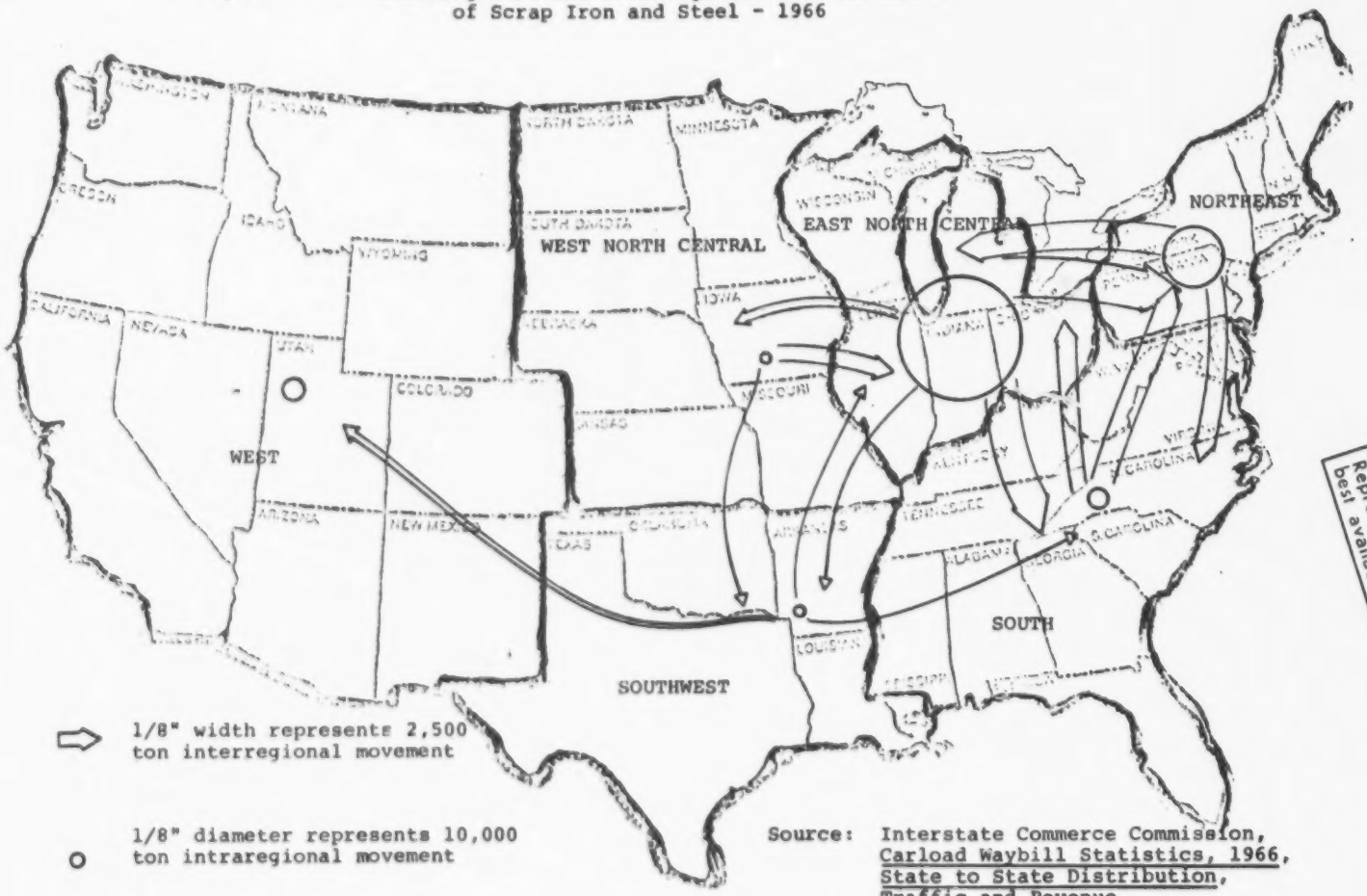
Source: Interstate Commerce Commission, Carload Waybill Statistics, 1960, State to State Distribution, Traffic and Revenue.

Table 4-28. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF COKE - 1966

Territorial movement	Number of tons
Northeast to Northeast	25,699
Northeast to South	1,131
Northeast to East North Central	36,372
South to South	7,592
South to Northeast	4,791
South to East North Central	9,684
South to Southwest	2,307
South to West	388
East North Central to East North Central	23,381
East North Central to Northeast	2,743
East North Central to South	5,551
East North Central to Southwest	744
West North Central to West North Central	1,048
West North Central to East North Central	4,114
West North Central to Southwest	250
Southwest to Southwest	7,466
Southwest to East North Central	1,891
Southwest to South	1,544
Southwest to West	1,986
West to West	9,314

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Figure 4-31. Interregional and Intraregional Rail Movements of Scrap Iron and Steel - 1966



Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

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Table 4-29. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF SCRAP IRON AND STEEL-1966

Territorial movement	Number of tons
Northeast to Northeast	58,514
Northeast to South	2,561
Northeast to East North Central	5,884
South to South	21,824
South to Northeast	4,433
South to East North Central	3,119
East North Central to East North Central	96,694
East North Central to Northeast	7,099
East North Central to South	5,989
East North Central to Southwest	312
East North Central to West North Central	1,790
West North Central to West North Central	7,167
West North Central to East North Central	3,953
West North Central to Southwest	650
Southwest to Southwest	7,900
Southwest to East North Central	248
Southwest to South	255
Southwest to West	1,193
West to West	22,122

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Table 4-30. WASTE PAPER RECOVERY BY CLASSIFICATION AND SOURCE - 1970.

Waste paper classification	Industrial converting plants	Post-consumer sources	Total	Percent
Mixed	765	1,874	2,639	22.0
News	21	2,214	2,235	18.6
Container	1,497	2,583	4,080	33.9
Pulp substitutes Deinking	2,407	660	3,067	25.5
Totals	4,690	7,331	12,021	100.0
Percentage	39.0	61.0	100.0	

Source: Midwest Research Institute, Paper Recycling, the Art of the Possible 1970-1985, 1973, p. 53.

Table 4-31. PERCENT OF U.S. ROUNDWOOD PRODUCTION BY STATE - 1970

State	Percent of Total U.S. Production
Alabama	9.1
Arkansas	3.7
Connecticut	.02
Delaware	.09
Florida	4.9
Georgia	10.3
Illinois	.09
Indiana	.1
Iowa	.05
Kentucky	.3
Louisiana	5.6
Maine	6.2
Maryland	.4
Massachusetts	.04
Michigan	.2
Minnesota	1.7
Mississippi	7.2
Missouri	.04
New Hampshire	.4
New Jersey	.07
New York	.7
North Carolina	5.8
Ohio	.5
Oklahoma	.3
Pennsylvania	1.1
Rhode Island	.01
South Carolina	4.7
Tennessee	.8
Texas	4.3
Vermont	.2
Virginia	3.2
West Virginia	.5
Wisconsin	2.2
Washington, Oregon, California	24.1
Other	1.09

Source: U.S. Department of Agriculture , 1970 Forest Service Experiment Station Reports.

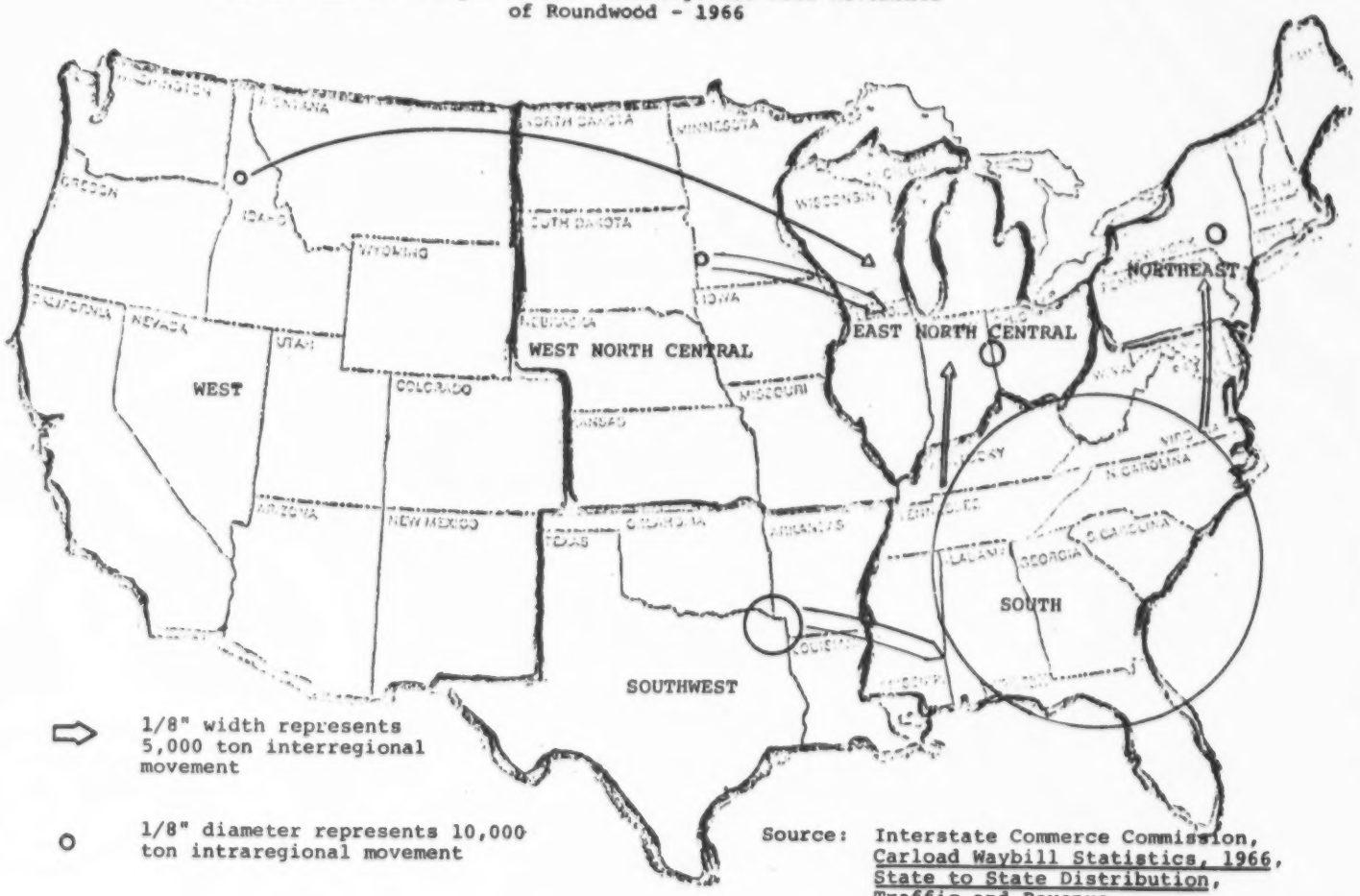
Table 4-32. PERCENT OF U.S. ROUNDWOOD CONSUMPTION BY STATE - 1970

State	Percent of total consumption
Alabama	8.2
Arizona	W
Arkansas	W
California	W
Connecticut	W
Florida	W
Georgia	11.1
Idaho	W
Indiana	W
Illinois	W
Kentucky	W
Louisiana	7.4
Maine	5.3
Maryland	W
Michigan	1.2
Minnesota	W
Mississippi	W
Missouri	W
Montana	W
New Hampshire	.3
New Jersey	.1
New York	.3
North Carolina	4.1
Ohio	.7
Oklahoma	W
Oregon	5.8
Pennsylvania	1.1
Rhode Island	W
South Carolina	4.6
Tennessee	.6
Texas	3.2
Vermont	W
Virginia	4.3
Washington	10.4
Wisconsin	3.6

W - Withheld by Commerce Department to avoid disclosure.

Source: American Paper Institute, The Statistics of Paper, 1972, Table III.

Figure 4-32. Interregional and Intraregional Rail Movements of Roundwood - 1966



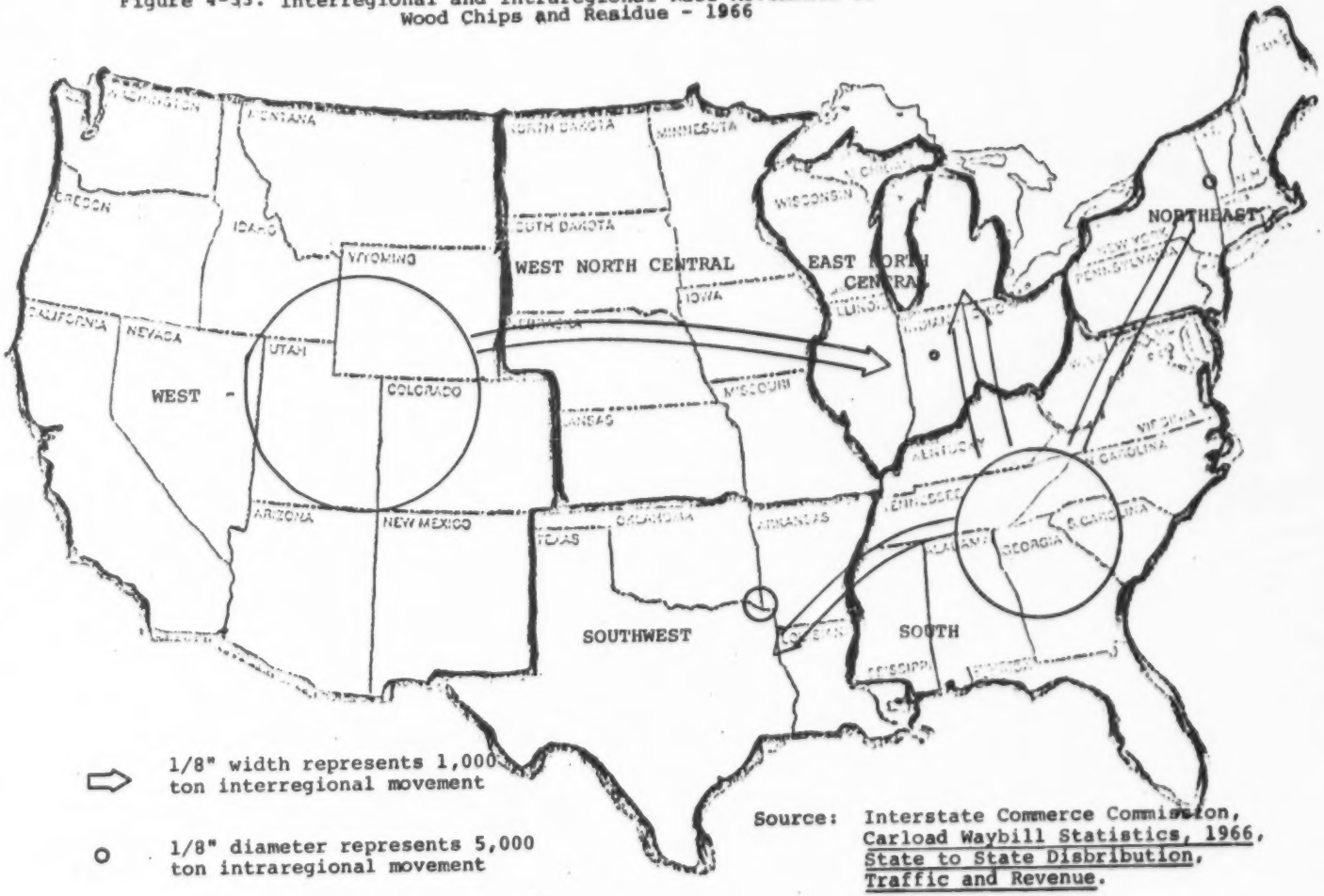
Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

Table 4-33. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF ROUNDWOOD - 1966

Territorial movement	Number of tons
Northeast to Northeast	16,871
South to South	235,007
South to Northeast	2,326
South to East North Central	549
East North Central to East North Central	23,812
West North Central to West North Central	3,975
West North Central to East North Central	4,063
Southwest to Southwest	47,070
Southwest to South	5,058
West to West	3,857
West to East North Central	790

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Figure 4-33. Interregional and Intraregional Rail Movements of Wood Chips and Residue - 1966



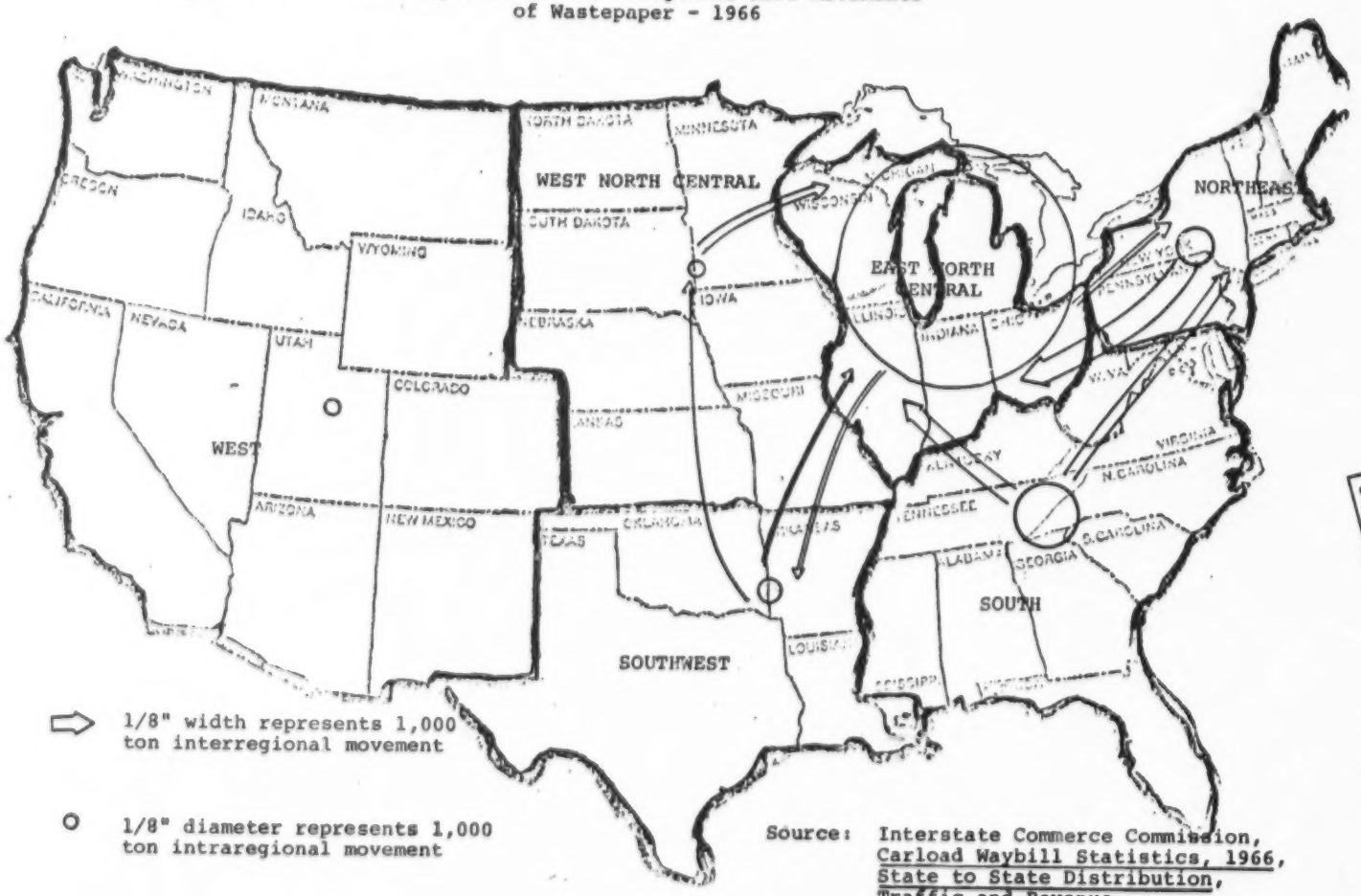
Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Disbribution, Traffic and Revenue.

Table 4-34. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF WOOD CHIPS AND RESIDUE - 1966

Territorial movement	Number of tons
Northeast to Northeast	5,380
South to South	49,064
South to Northeast	840
South to East North Central	1,838
South to Southwest	883
East North Central to East North Central	1,538
Southwest to Southwest	19,921
West to West	63,505
West to East North Central	1,295

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Figure 4-34. Interregional and Intraregional Rail Movements of Wastepaper - 1966



Source: Interstate Commerce Commission, Carload Waybill Statistics, 1966, State to State Distribution, Traffic and Revenue.

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Table 4-35. INTERREGIONAL AND INTRAREGIONAL RAIL MOVEMENTS OF WASTEPAPER -1966

Territorial movement	Number of tons
Northeast to Northeast	4,276
Northeast to East North Central	1,264
South to South	5,933
South to East North Central	922
South to Northeast	452
East North Central to East North Central	14,161
East North Central to Northeast	360
East North Central to Southwest	210
West North Central to West North Central	1,565
West North Central to East North Central	836
Southwest to Southwest	2,401
Southwest to East North Central	204
Southwest to West North Central	195
West to West	1,315

Source: Interstate Commerce Commission, Carload Waybill Statistics, State to State Distribution, Traffic and Revenue, 1966.

Table 4-36. REPRESENTATIVE TRANSPORTATION CHARACTERISTICS OF MISSISSIPPI RIVER BARGES

Dimensions: 195 ft. x 35 ft. x 15 ft.

Motive Power: 5,000 to 9,000 HP tugs

Maximum number of barges per tow:

River	Number*
Mississippi	40
Ohio	15, 16
Illinois	10

* A function of river size and lock size.

Costs: Tug (5,000 HP): $2,500,000 to $3,000,000

Barge: $130,000

Loading:

Commodity	Load (tons)
Grains, coal, ore	1,500 to 1,600
Scrap iron and steel	700 to 1,000
Paper	300 to 1,350

Source: 1971, Inland Waterborne Commerce Statistics, The American Waterways Operators, Washington, D.C.

The appendix to Chapter V contains additional tables referred to in the text; detailed inland water carrier freight rates for each commodity; and historical data on the prices of those commodities of interest to this study.

Supplementary table

Table 5-24. CLASS I MOTOR CARRIER REVENUE AND LOADING DATA FOR VIRGIN AND SECONDARY STEEL RAW MATERIALS - 1970

Movement	Average class I motor carrier revenue and loading statistics						
		Virgin material					Secondary material
		Iron ore	Metallurgical coal	Coke	Fluxing limestone	Pig iron	Scrap iron & steel
Nationwide	Tons/truckload	15.5	25.0	19.1	NA	18.8	19.9
	$/truckload	333.0	56.0	235.0	NA	297.0	267.0
	$/ton	21.43	2.23	12.26	NA	15.84	13.42
Mid-Atlantic	Tons/truckload	13.9	29.7	17.3	NA	21.4	17.0
	$/truckload	290.0	86.0	351.0	NA	179.0	278.0
	$/ton	20.91	2.91	20.36	NA	18.36	16.35
Central	Tons/truckload	18.6	21.8	19.4	NA	18.1	24.4
	$/truckload	278.0	25.0	172.0	NA	331.0	240.0
	$/ton	14.95	1.13	8.88	NA	18.25	10.04
Pacific	Tons/truckload	11.2	12.5	8.6	NA	17.3	18.40
	$/truckload	444.0	534.0	195.0	NA	131.2	288.0
	$/ton	39.54	42.74	22.71	NA	7.59	15.63

Source: Interstate Commerce Commission, Freight Commodity Statistics, Class I Motor Carriers, 1970.

Table 5-25. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR IRON ORE - 1973

Waterway system	Route #	Origin	Desgination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Great Lakes	1	Lake Superior, Duluth	Chicago	765	2.19	.0029
	2		Cleveland	800	2.19	.0027
	3		Toledo	725	2.19	.0030
	4		Buffalo	950	2.19	.0023
	5	Escanaba, Michigan	Lake Erie	385	1.65	.0043
	6		Chicago	260	1.31	.0050
	7	Marquette, Michigan	Chicago	535	1.96	.0037
	8		Cleveland	550	1.96	.0036
	9		Detroit	450	1.96	.0044
	10		Toledo	500	1.96	.0039
	11		Buffalo	700	1.96	.0028
Mississippi		Rates are not regulated. Each customer can be quoted a different price depending on the specs of the cargo. Very comparable to coal rates.				

Table 5-25. (continued) REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR IRON ORE - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Warrior	12	Mobile	Port Birmingham	260	(450 T min) 1.70	.0065

Source: Personal communication with individual barge companies and published freight tariff schedules.

Table 5-26. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR PIG IRON - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
					(1200 T min)	
Atlantic waterway	30	Baltimore	Burlington,N.J.	125	3.05	.0244
	31		Philadelphia	105	2.66	.0253
	32	Newport News	Burlington	255	4.16	.0163
	33	Norfolk	Philadelphia	215	3.60	.0167
					($/2240 lbs)	
Warrior, Atlantic	34	Port Birmingham	Key West	810	(1000 T min) 10.43	.0129
					($/2240 lbs.)	
					(450 T min)	
	35	Port Birmingham	Baton Rouge	365	5.52	.0151
	36		Port Arthur	425	7.50	.0176
	37	New Orleans	Greenville	265	4.61	.0174
	38		Memphis	425	4.61	.0108
	39		Port Arthur	250	3.78	.0151

Source: Personal communication with individual barge companies and published freight tariff schedules.

Table 5-27. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR COAL/COKE-1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Atlantic Waterway (coke)	13	Philadelphia	Charleston	650	(1000 T min) 4.50	.0069
Great Lakes (coke and coal)	14	Toledo	Detroit	50	.75	.0150
Mississippi (coal)	15	Kingston, Illinois	Chicago	--	1.02	--
	16	Kingston	La Salle	--	.60	--
	17	Louisville	Chicago	665	6.97	.0105
	18	Chicago	New Orleans	1104	7.90	.0072
	19	Louisville	New Orleans	785	7.28	.0093
	20	Louisville	St. Louis	375	4.25	.0113
	21	Memphis	Minneapolis	1016	6.80	.0067
	22	Pittsburgh	New Orleans	1115	8.63	.0077
	23	Houston	Pittsburgh	1835	11.17	.0061

Table 5-27. (continued) REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR COAL/COKE - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Warrior, Mississippi (coal)	24	Port Birmingham, Alabama	Key West	810	5.55	.0069
	25	Mobile	Key West	550	4.70 (450 T min)	.0085
	26	Port Birmingham, Alabama	Corpus Christi	985	5.90	.0060
	27		Memphis	500	4.00	.0080
	28	Mobile	Greenville	355	3.46	.0097
	29	New Orleans	Houston	525	2.80	.0053

Source: Personal communication with individual barge companies and published freight tariff schedules.

Table 5-28. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR SCRAP IRON AND STEEL - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Mississippi Ohio River	40	Cincinnati	Pittsburgh	360	(1000 T min) 2.29	.0064
Ohio River	41	Cincinnati	Portsmouth, Ohio	95	1.47	.0155
Ohio/Miss.	42	Cincinnati	St. Louis	485	3.86	.0080
Ohio/Miss./ Gulf	43	Cincinnati	Houston	1475	7.47	.0051
Great Lakes	44	Buffalo	Duluth	950	6.93	.0073
	45	Chicago	Cleveland	725	6.17	.0085
	46	Cleveland	Buffalo	160	3.37	.0211
	47	Detroit	Buffalo	260	3.11	.0120
	48	Muskegan	Saginaw	400	5.25	.0131
Atlantic Waterway	49	New York	Newburgh	60	1.43 ($/2240 lbs)	.0238
	50	Washington	Baltimore	50	(1100 T min) 3.68	.0736

Table 5-28. (continued) REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR SCRAP IRON AND STEEL - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Warrior, Mississippi	51	Port Birmingham	Little Rock	715	($/2240 lbs.) (600 T min) 9.41	.0132
	52	Port Birmingham	Port Arthur	685	($/2240 lbs.) (450 T min) 7.80	.0114
	53		Pensacola	360	5.91	.0164
	54		New Orleans	435	4.82	.0111
	55	New Orleans	Memphis	425	4.77	.0112
	56	Mobile	Port Birmingham	260	4.53	.0174

Source: Personal communication with individual barge companies and published freight tariff schedules.

Table 5-29. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR ROUNDWOOD -1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freignt rate $/net ton	Rate/ ton-mile
Mississippi	1	Clinton, Iowa	Memphis	550	(1000 T min) 3.75	.0068
	2	DuBuque	Memphis	806	4.00	.0050
	3	Baton Rouge	Chicago	1029	(600 T min) 7.04	.0068
	4	Fort Smith, Arkansas	Chicago	928	(900 T min) 7.71	.0083

Source: Personal communication with individual barge companies.

Table 5-30. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR WOOD PULP-1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Atlantic Waterway	5	Brunswick, Georgia	Philadelphia	775	(1500 T min) 6.75	.0087
Great Lakes		Very little wood pulp is shipped along the Great Lakes. What is shipped is handled primarily by the Canadians.				
Mississippi	6	Guntersville, Alabama	Evansville	400	(1200 T min) 3.00	.0075
	7	Greenville	Chicago	804	3.94	.0049
	8	Pine Bluffs	New Orleans	340	3.80	.0011
	9	Pine Bluffs	Pittsburgh	860	5.31	.0062
	10	Natchez	Chicago	944	(1000 T min) 4.96	.0053

Source: Personal communication with individual barge companies and published freight tariff schedules.

Table 5-31. REPRESENTATIVE INLAND WATER CARRIER FREIGHT RATES FOR WASTEPAPER - 1973

Waterway system	Route #	Origin	Destination	Distance (miles)	Freight rate $/net ton	Rate/ ton-mile
Mississippi	11	Houston	Natchez,Miss.	660	(600 T min) 4.76	.0072
	12	Calhoon, Ill.	Natchez	600	5.64	.0094
	13	Mobile	Louisville	985	11.53	.0117
	14	Mobile	Cincinnati	1085	11.90	.0110
	15	St. Francisville,Ill.	New Orleans	685	(1000 T min) 2.17	.0015
Great Lakes		Nothing being shipped on American side.				

Source: Personal communication with individual barge companies.

Steel raw materials

Table 5-32. LAKE SUPERIOR IRON ORE PRICES
($/gross ton)

Year	Selected grades of iron ore			
	Old range, non-bessemer	Mesabi, reg. un-screened	High phosphorus	Pellets
1960	10.90	10.65	10.65	.252
1961	10.90	10.65	10.65	.252
1962	10.90	10.65	10.65	.252
1963	10.90	10.65	10.65	.252
1964	10.90	10.65	10.65	.252
1965	10.80	10.55	10.55	.252
1966	10.80	10.55	10.55	.252
1967	10.80	10.55	10.55	.252
1968	10.80	10.55	10.55	.252
1969	11.05	10.80	10.80	.266
1970	11.05	10.80	10.80	.266
1971	11.42	11.17	11.17	.280
1972	11.42	11.17	11.17	.280
1973*	11.96	11.71	11.71	.291

*Effective 12/12/72.
Source: Iron Age, years 1960-1973, Lake Superior Ore Prices.

Table 5-33. AVERAGE WHOLESALE PRICE OF BITUMINOUS COAL (screenings, industrial use)

Year	$/short ton
1960	5.16
1961	5.02
1962	4.92
1963	4.75
1964	4.80
1965	4.79
1966	4.95
1967	5.22
1968	5.40
1969	6.05
1970	7.64
1971	9.70
1972	10.27*

Source: Commodity Research Bureau, Inc., Commodity Year Book 1972, June 1972, p. 90.

* Jan. and Feb. only

Table 5-34. AVERAGE PRICE OF OVEN FOUNDRY COKE (F.O.B. at Birmingham, Alabama)

Year	$/ton
1960	30.35
1961	30.35
1962	30.35
1963	30.35
1964	31.35
1965	31.85
1966	32.73
1967	33.35
1968	34.56
1969	36.35
1970	42.54
1971	49.27

Source: Commodity Research Bureau, Inc., Commodity Year Book 1972, June 1972, p. 106.

Table 5-35. AVERAGE SCRAP IRON AND STEEL PRICES-CHIGAGO
($/gross ton)

Year	Selected grades of scrap iron and steel				
	No. 1 steel	No. 2 steel	No.1 bundles	No.2 bundles	Machine shop turnings
1960	30.00-31.00	27.58-28.58	30.66-31.66	19.16-20.16	14.33-15.33
1961	35.25-36.25	31.08-32.08	36.08-37.08	22.83-23.83	16.08-17.08
1962	27.83-28.83	25.58-26.58	28.58-29.58	18.58-19.58	13.16-14.16
1963	28.83-29.83	25.42-26.42	29.75-30.75	18.50-19.50	13.08-14.08
1964	35.33-36.33	30.08-31.08	36.25-37.25	21.33-22.33	16.83-17.83
1965	34.50-35.50	31.08-32.08	35.33-36.33	20.50-21.50	17.66-18.66
1966	31.25-32.25	28.33-29.33	31.92-32.92	19.42-20.42	16.75-17.75
1967	27.83-28.83	24.25-25.25	28.92-29.92	18.50-19.50	13.08-14.08
1968	23.79-24.79	20.33-21.33	25.13-26.13	18.33-19.33	10.16-11.16
1969	29.67-30.67	24.75-25.75	30.83-31.83	22.58-23.58	9.58-10.58
1970	41.25-42.25	34.17-35.17	42.25-43.25	27.67-28.67	17.75-18.75
1971	32.92-33.92	29.08-30.08	34.00-35.00	24.00-25.00	17.00-18.00
1972	36.18-37.17	31.58-32.58	36.58-37.58	27.08-28.08	17.75-18.75

Source: Iron Age, years 1960-1972, Ferrous Scrap Prices.

Table 5-36. SCRAP IRON PRICES FOR SELECTED CITIES, EFFECTIVE JANUARY 17, 1973
($/gross ton)

City	Grade of scrap iron				
	No. 1 steel	No.2 steel	No. 1 bundles	No.2 bundles	Machine shop turnings
New York	35-36	31-32	39-40	24-25	5
Cleveland	44-45	---	44-45	32-33	13-14
Boston	30-31	25-26	33-34	18-19	---
Seattle	41-42	38-39	---	30-31	---
Birmingham	50-51	40-41	45-46	34-35	12-13
St. Louis	39-40	34-35	39-40	29-30	15
Los Angeles	39	35	34	31	7
San Francisco	40-41	37-38	30-31	26-27	6
Chicago	44-45	36-37	44-45	31-32	19-20
Philadelphia	47-48	41	50-51	33	10-11
Detroit	35-36	26-27	39-40	25-26	7
Houston	48-49	46-47	48-49	35-36	---
Youngstown	40-41	28-29	40-41	27-28	11-12
Buffalo	30-31	25-26	32-33	---	5-6
Cincinnati	37	35	37-38	20-21	7
Pittsburgh	48-49	44-45	---	31	21

Source: Secondary Raw Materials, January 1973, p. 78.

Table 5-37. ROUNDWOOD PRICES BY SELECTED AREA AND SPECIES: 1960-1971
(current $/standard cord)

Year	Midsouth			Southeast		Northern New Hampshire	
	Southern pine	Hard-woods	Southern pine chips	Southern pine	Hard-woods	Spruce & fir	Hard-woods
1960	16.05	13.10	14.40	16.45	13.60	22.25	18.50
1961	15.85	13.05	14.50	16.55	13.50	21.00	17.60
1962	15.80	13.20	14.55	16.55	13.40	21.00	17.20
1963	15.75	13.10	14.40	16.55	13.45	21.00	15.70
1964	15.90	13.15	14.30	17.00	13.60	21.00	15.70
1965	16.30	13.80	14.40	17.65	14.35	21.00	16.10
1966	16.85	15.05	15.15	18.80	14.90	21.75	18.05
1967	17.15	15.20	15.35	19.25	15.55	22.10	18.05
1968	17.75	15.85	15.80	19.85	15.60	22.10	--
1969	18.55	16.85	17.15	20.90	16.35	21.00	18.90
1970	18.80	16.95	16.40	21.10	17.15	22.50	20.00
1971	--	--	--	--	--	22.50	20.25

Source: Hair, Dwight and Alice H. Ulrich, The Demand and Price Situation for Forest Products 1971-72 , Department of Agriculture, July 1972, Table 29.

Table 5-38. AVERAGE PRICE OF WOOD PULP
(unbleached sulphate)

Year	$/ton
1960	120.00
1961	120.00
1962	118.54
1963	117.71
1964	123.44
1965	123.75
1966	122.50
1967	122.50
1968	122.50
1969	122.50
1970	144.13
1971	150.13

Source: Commodity Research Bureau, Inc., Commodity Year Book 1971 and Commodity Year Book 1972, June 1972, p. 241.

Table 5-39. AVERAGE WASTEPAPER PRICES - NEW YORK
($/ton)

Year	Selected grades of wastepaper				
	No. 1 mixed paper	No. 1 news	Old corrugated containers	Hard white envelope cuts	Manila tab cards
1960	7.00-9.00	12.50-13.50	20.75-21.75	100.00-105.00	63.50-66.00
1965	12.00-13.00	15.50-19.50	20.00-22.50	90.00-95.00	65.00-70.00
1970	2.50-6.00	8.50-14.00	13.50-22.50	60.00-85.00	65.00-90.00
1971	2.00-5.00	6.50-14.00	12.00-20.00	72.50-87.00	59.00-84.00
1972	3.50-9.00	10.50-15.50	15.00-20.00	82.00-95.00	64.00-87.50

Source: Paper Trade Journal, years 1960, 1965, 1970-72, Prices of Papermaking Fibers, Waste Paper Market.